

2017

# Two Essays on Social Sharing Effects on Consumer Memories

Li Huang

*University of South Carolina*

Follow this and additional works at: <https://scholarcommons.sc.edu/etd>



Part of the [Business Administration, Management, and Operations Commons](#)

---

## Recommended Citation

Huang, L. (2017). *Two Essays on Social Sharing Effects on Consumer Memories*. (Doctoral dissertation). Retrieved from <https://scholarcommons.sc.edu/etd/4253>

This Open Access Dissertation is brought to you by Scholar Commons. It has been accepted for inclusion in Theses and Dissertations by an authorized administrator of Scholar Commons. For more information, please contact [dillarda@mailbox.sc.edu](mailto:dillarda@mailbox.sc.edu).

# TWO ESSAYS ON SOCIAL SHARING EFFECTS ON CONSUMER MEMORIES

by

Li Huang

Bachelor of Business Administration  
South China Normal University, 2005

Master of Arts  
City University of Hong Kong, 2006

Master of Philosophy  
City University of Hong Kong, 2010

Doctor of Philosophy  
City University of Hong Kong, 2013

---

Submitted in Partial Fulfillment of the Requirements

For the Degree of Doctor of Philosophy in

Business Administration

Darla Moore School of Business

University of South Carolina

2017

Accepted by:

Priyali Rajagopal, Major Professor

Anastasiya Pocheptsova Ghost, Committee Member

Abhijit Guha, Committee Member

Nicole Votolato Montgomery, Committee Member

Cheryl L. Addy, Vice Provost and Dean of the Graduate School

© Copyright by Li Huang, 2017  
All Rights Reserved.

## ACKNOWLEDGEMENTS

I would like to express my deepest gratitude to my advisor, Dr. Priyali Rajagopal, for her continuous support throughout the entire Ph.D. program. This dissertation is not possible without her guidance, motivation, and patience. She is my real model of a rigorous researcher and an excellent mentor (competent and warm). From her, I learned not only how to do research but also how to be a better person. I feel so blessed and fortunate to have her as my advisor.

I would also like to thank my committee members, Drs. Anastasiya Pocheptsova Ghosh, Abhijit Guha, and Nicole Votolato Montgomery, for their insightful comment for this dissertation. I am grateful for their sincere help in planning my academic career.

My sincere gratitude is due to Dr. Robert S. Wyer who inspired me to pursue Ph.D in marketing and also provided helpful comment on my research. I am also grateful to Dr. Jennifer Argo who offered timely advice on the first essay of my dissertation. This dissertation is certainly better with their guidance.

Lastly, I thank my parents Jianqiu Huang and Weihong Dai, husband Bin Chen, brother Hui Huang, and my children Cherie and Chase, for their love and support.

## ABSTRACT

Social sharing is universal in everyday life. Every day consumers share news, opinions, and personal experiences using different media, including face-to-face communications, cellphones, texting, email, and other social media platforms (e.g. Facebook, Twitter). Word-of-Mouth, a common type of social sharing has been found to be fundamental to marketing and has been shown to significantly impact firms' sales and revenues. However little is known about the effects of WOM on consumer memories. Since consumer memory is an important variable in marketing due to its significant impact on consumer judgments and decisions, my dissertation addresses this gap and examines the effects of social sharing on consumer memory. Specifically, essay 1 considers whether the retelling of consumption experiences with others enhances or decays memory for that experience, while essay 2 considers the differences between the retelling of experiences with human partners versus technological partners (e.g. Facebook, Blogging, Review sites).

Traditional memory literature predicts an enhancement effect after social sharing based on the fact that retelling promotes memory rehearsal, and thereby enhances memory accessibility. However, in Essay 1, I propose and document a “forgetting-after-sharing effect” due to memory outsourcing. Across five studies, I find that when people share identity relevant experiences (versus control) with close (distant) others, they forget (remember) the details of the experience (studies 1-3), because of outsourcing the details of their memories to a memory cloud (rehearsal) - study 4. Thus, sharing can enhance or

decrease memory for the shared event depending on the type of event shared (identity relevance, valence) and who the event is shared with (e.g. close friend versus distant stranger human vs technology – study 5).

As people adapt to sharing with technological partners (e.g. social media), researchers are not clear how aspects of the technological partners can change the way the shared information is remembered. In essay 2, I focus on examining whether and when technological devices may function like human partners to create a memory cloud, and find significant differences between sharing with humans versus technologies. Specifically, I find that technologies work like distant human sharing partners (e.g. acquaintances) rather than close friends and hence do not lead to memory decay (study 1). However, anthropomorphizing technologies makes them similar to close human partners, leading to memory outsourcing and subsequent memory decay and attitude strength dilution (study 2), but altering the accessibility of the anthropomorphized technology attenuates this memory decay (study 3). Finally, I find that memory outsourcing to technology is driven by perceptions of partner quality and that changing the roles anthropomorphized technologies play (partner versus servant) can impact (amplify or mitigate) memory outsourcing and thereby memory decay (Study 4).

## TABLE OF CONTENTS

ACKNOWLEDGEMENTS.....	iii
ABSTRACT .....	iv
LIST OF FIGURES .....	viii
INTRODUCTION .....	1
ESSAY 1: “WE” HAVE A MEMORY CLOUD: HOW SOCIAL SHARING AFFECTS CONSUMER MEMORIES .....	7
1.1 ABSTRACT .....	8
1.2 INTRODUCTION .....	8
1.3 SHARING AND MEMORY .....	12
1.4 RELATIONSHIP CLOSENESS AND MEMORY CLOUD .....	13
1.5 MODERATING ROLE OF IDENTITY RELEVANCE.....	15
1.6 MEMORY OUTSOURCING AND FORGETTING .....	16
1.7 STUDY 1 .....	18
1.8 STUDY 2 .....	25
1.9 STUDY 3 .....	30
1.10 STUDY 4 .....	35
1.11 STUDY 5 .....	40
1.12 GENERAL DISCUSSION.....	46
ESSAY 2 IS TECHNOLOGY A DANGEROUS DEPENDENCY? THE ROLE OF ANTHROPOMORPHISM IN DIGITAL SHARING .....	62
2.1 ABSTRACT .....	63

2.2 INTRODUCTION .....	63
2.3 SOCIAL SHARING AND TECHNOLOGY .....	68
2.4 ANTHROPOMORPHISM AND PERCEIVED PARTNER QUALITY .....	70
2.5 PERCEIVED PARTNER QUALITY AND OUTSOURCING .....	71
2.6 STUDY 1 .....	73
2.7 STUDY 2 .....	79
2.8 STUDY 3 .....	84
2.9 STUDY 4 .....	91
2.10 GENERAL DISCUSSION.....	95
CONCLUSION.....	111
REFERENCES .....	113



## LIST OF FIGURES

Figure 1.1 Study 1 Corrected Recognition by Sharing Partner and Identity Relevance.....	51
Figure 1.2 Study 1 Cued Recall by Sharing Partner and Identity Relevance .....	52
Figure 1.3 Study 2 Corrected Free Recall by Sharing Partner and Identity Relevance.....	53
Figure 1.4 Study 3 Corrected Free Recall by Sharing Partner and Identity Relevance.....	54
Figure 1.5 Study 3 Corrected Recognition by Sharing Partner and Identity Relevance.....	55
Figure 1.6 Study 4 Corrected Free Recall by Sharing Partner and Identity Relevance.....	56
Figure 1.7 Study 4 Corrected Recognition by Sharing Partner and Identity Relevance.....	57
Figure 1.8 Study 4 Perceived Enjoyment by Sharing Partner and Identity Relevance.....	58
Figure 1.9 Study 5 Corrected Recognition by Sharing Partner and Identity Relevance.....	59
Figure 1.10 Study 5 Brand Accessibility by Sharing Partner and Identity Relevance .....	60
Figure 1.11 Study 3 Attitude Confidence by Sharing Partner and Identity Relevance .....	61
Figure 2.1 Study 1 Corrected Recognition by Sharing Partner and Identity Relevance..	103
Figure 2.2 Study 1 Corrected Hits by Sharing Partner and Identity Relevance .....	104
Figure 2.3 Study 2 Corrected Recognition by Sharing Partner and Identity Relevance..	105
Figure 2.4 Study 2 Attitude Confidence by Sharing Partner and Identity Relevance .....	106
Figure 2.5 Study 3 Corrected Recognition by Sharing Partner and Identity Relevance..	107
Figure 2.6 Study 3 Attitude Confidence by Sharing Partner and Identity Relevance .....	108
Figure 2.7 Study 4 Corrected Recognition by Sharing Partner and Identity Relevance..	109
Figure 2.8 Study 4 Perceived Specialness by Sharing Partner and Identity Relevance ..	110

## INTRODUCTION

Social sharing - defined as the act of communicating with another person (Echterhoff, Higgins, and Levine 2009) - is widely prevalent among consumers because people have a fundamental tendency to talk and share with others (Rimé et al. 1991) as well as due to the positive outcomes of such sharing, including enhanced interpersonal relationships, subjective well-being, and physical health (Pennebaker and Rimé 2001). In marketing, as Belk (2013) points out, we have entered an “era of social sharing” with consumer sharing of consumption experiences having become incredibly easy and popular with the aid of digital technologies such as the Internet, computer, social media, mobile phone, digital cameras etc. (Berger 2014). Through various means including face-to-face verbal communication, SMS texting, instant messaging, twittering, blogging, emailing etc., consumers communicate and interpret their experiences, construct memories, and develop and maintain relationships (Schank and Abelson 1995).

Due to its frequency and importance, both marketers and academics have paid much attention to this phenomenon. Recent work on social sharing effects on consumer behavior has revealed that it can influence consumers’ product trial and adoption (Arndt 1967), switching behavior (Wangenheim and Bayon 2004), and attitudes (Bone 1995). Word of mouth (WOM), a type of social sharing that involves brand/product mentioning, has been found to have positive effects on sales revenues (Chevalier and Mayzlin 2006), brand impression (Keller and Libai 2009), and other important marketing outcomes (Duan, Gu and Whinston 2008; Liu 2006; Chen and Lurie 2013).

While this prior research on consumers' social sharing has examined what drives people to share (Berger 2014), what topics people talk about (Berger 2013) and how to increase sharing volume (Berger and Schwartz 2011; Chen and Berger 2013; Berger and Milkman 2012; Chen and Berger 2016), the one area that has received scant attention is the effects of social sharing on consumer memory. Given the importance of memory on consumer attitudes, intentions and behaviors, this is an important omission (Alba, Hutchinson and Lynch 1991). While marketing scholars and practitioners widely acknowledge that understanding memory is vital to understanding consumer behavior, surprisingly little is known about how social factors impact encoding and retrieval of consumer knowledge (Dahl 2013). My dissertation addresses these gaps and examines how social sharing of consumption experience affects consumer memory.

While the majority of prior research looks at memory at the individual level and emphasizes how personal factors shape memory, my dissertation examines memory at a group level and explores how the notion of "group mind" can develop and be utilized in social sharing situations. Because consumer sharing involves at least two parties in a social context, I investigate the sharing effects from a person-situation perspective. Specifically, I focus on how the characteristics of the sharer (e.g. motivation to protect memory), the sharing partners (relationship closeness, memory ability, human vs. nonhuman), the type of experience shared (identity relevance, valence) and their joint-interaction affects memory and attitudes.

Two essays constitute this dissertation. Essay 1 examines whether social sharing can enhance or attenuate consumer memories and finds that social sharing of identity-relevant experiences with close others attenuates the experiences shared. That is, social

sharing can lead to forgetting when there is a memory cloud available for outsourcing (i.e. close partner) and when the experiences are worth saving to this cloud (i.e. identity relevant). This “forgetting-after-sharing” is novel and intriguing since prior memory literature only documents memory enhancement after sharing/rehearsal. I further document that beliefs about the memory safety on the memory cloud is the key to facilitate this “forgetting-after-sharing” effect. Essay 2 focuses on the differences between sharing with human versus nonhuman technological partners and finds significant differences between the two. In human-technology interaction, people’s perceptions about the technology can significantly alter their memories. Thus, I find that an anthropomorphized technological partner can successfully mimic human partners such that sharing with an anthropomorphized technology also induces the forgetting-after-sharing effect. However, sharing with a non-anthropomorphized (objectified) technological partner does not result in the forgetting-after-sharing effect. I argue that this happens because anthropomorphism enhances perceived partner quality and makes the technology more equivalent to human close partner and therefore a memory cloud is activated during sharing, while non-anthropomorphized technologies are rated as lower in perceived partner quality and hence do not activate the memory cloud.

In the next section, I will review the literature related to the concept of memory cloud and outline how my dissertation builds on and extends past research. I then summarize the impact and, followed by two completed essays with empirical results.

## Literature Review

Early research about interdependent cognition by Wegner, Giuliano, and Hertel (1985) helped shift the focus from understanding the thinking processes of individuals to

those of intimate dyads. Subsequent research has shown that close relationship partners (e.g. spouses, friends) are believed to be interdependent in many aspects, including their thoughts. The central idea of cognitive interdependence is transactive memory, which concerns how knowledge is transferred, stored and collectively retrieved (Wegner 1995). A transactive memory system (TMS) operates on three components: specialization (unique knowledge for each member); credibility (regard other member's knowledge as credible); and coordination (access each other's expertise) (Lewis 2004). Within transactive memory systems therefore there are clear labor divisions – e.g. one person will remember details about finances while the other will remember details about household chores. Such memory systems are cognitively efficient since each member of the system has to remember only partial information.

In my research, I conceptualize “memory cloud” as akin to but also different from TMS. Specifically, I propose that a memory cloud is an informal, unstructured, and unconscious storage device which develops over time in close relationships. Thus, it is different from a transactive memory system which is a formally structured way to store information. Research has shown that people in close relationships can develop a shared memory system that pools cognitive resources for better efficiency (Wegner et al. 1985). Such partners use each other's memories as extensions of their own. Consistent with this basic notion of expanding cognitive capacity by using others' memories, I make the prediction that close partners have a virtual memory cloud for uploading and saving meaningful memories. Social sharing can activate memory uploading when a memory cloud is available (e.g. talking to a close friend), especially when the memories shared are meaningful and worthy remembering (e.g. identity relevant). On one hand, outsourcing

memories to the memory cloud secures people by having a backup copy on the cloud. On the other hand, people are motivated to free cognitive resources to process new information and remember externally unavailable information (Storm and Stone 2015). Thus, the memories which have been shared (which have a copy externally) are more likely to be erased than those that have not been “backed up”. Ironically, an attempt to backup meaningful memory induces individual memory decay for that memory, I term this effect “forgetting-after-sharing” effect.

This memory cloud differs from TMS that it does not need expertise to divide cognitive labor. It can operate on a belief that the other person is trustworthy, the memory storage is safe, and the person is accessible. My conceptualization of memory cloud is more flexible than TMS that it has no imposed formal structure and it can function on perceptual beliefs, rather than actual coordination. Most of the research on TMS relies heavily on the visible availability of the knowledge (e.g. knowing the information is on Google, the pictures are on the digital camera), while the memory cloud concept I propose does not necessarily require real availability. It is shored up by the sharer’s belief that closer other will remember what is important to him/her. This distinction from TMS expands the literature on cognitive interdependence by providing a framework that can explain shared cognition in a less formal social setting.

Based on this concept of a memory cloud, my two essays examine whether, when and how social sharing activates memory clouds and the impact of such activation on consumer memories for the shared experience. Essay 1 finds that important memories are shared and outsourced to the memory cloud (to save). However, saving a copy externally reduces the need to keep the copy internally. As a result, memory outsourcing to the

memory cloud can lead to forgetting of the details of that memory. I also investigate important moderators to this forgetting-after-sharing effect including information type (identity relevance and valence) and partner type (relationship quality, memory reliability).

Building on the findings from Essay 1, I examine how memory clouds differ when the sharing audience is non-human (technology). While recent research has begun to look at reliance on technology as a TMS partner (e.g. sparrow et al. 2011, Henkle 2014; Storm and Stone 2015), they all treat technology as a still storage tool little work has considered technology as an interacting partner from the perspective of shared cognition. To the best of my knowledge, my research is the first to examine anthropomorphism of technology as an interaction partner and how the humanized perception affects memory.

To summarize, my dissertation contributes by exploring the understudied area – how memory is transferred at group level and how a group level memory cloud operates in social sharing setting. While past memory literature only documents memory enhancement effect after rehearsal, my research is the first to demonstrate the intriguing effect that sharing can impair memory regardless of additional rehearsal. My dissertation also fills an important gap in the literature on how anthropomorphism can impact memory.

ESSAY 1: “WE” HAVE A MEMORY CLOUD: HOW SOCIAL SHARING  
AFFECTS CONSUMER MEMORIES



## 1.1 ABSTRACT

Can sharing memories about an event enhance or decrease memory for that event? In the present research, I focus on answering this question and show that sharing can enhance or decrease memory for the shared event depending on the type of event shared (identity relevance, valence) and who the event is shared with (e.g. close friend versus distant stranger human vs technology). Specifically, I find that when a highly identity-relevant event is shared with a close sharing partner (relative stranger), memory for the event is attenuated (enhanced) rather than enhanced (attenuated). I find the reverse for low identity-relevant events. In other words, contrary to the intuition and research on how sharing facilitates memory rehearsal and thereby enhances memory strength; I find that sharing with a close relationship partner may decrease memory. I suggest that this finding occurs to a reliance on a memory cloud among close others. That is, thinking of having backed up the memories to the memory cloud decreased need to remember the identity-relevant event.

## 1.2 INTRODUCTION

Consumers often discuss and share their memories of experiences with others. Thus, we talk to and text with our friends on the phone, we post on Facebook and Instagram, tweet on Twitter and may blog about our experiences. Indeed, 40% of all conversations have been found to consist of consumers talking about themselves (Tamir and Mitchell 2012). What effect does such sharing have on our memories for the shared event? An intuitive view supported by past research is that sharing involves retelling of the event, thereby facilitating rehearsal in memory, which ought to increase memory strength and make memory for the shared event stronger (more accurate, easier to

access). Thus, the more we share our experiences, the better we ought to remember those experiences.

In contrast to this intuition, I suggest that sharing our memories may either enhance or attenuate our memories for the shared event depending on the type of event shared (identity relevance) and who the event is shared with (e.g. close friend versus distant stranger). I find that when highly identity-relevant experiences (e.g. details of a “girls’ night out”) are shared with close friends/partners, memory for such experiences is attenuated, rather than enhanced. I term this effect the “forgetting-after-sharing” and suggest that it occurs due to memory outsourcing to the memory cloud (a collective memory storage) among close others. In computing terminology, a memory cloud is a server that all computers within a network upload to and backup stored information to be later accessed (Rudo 2012). I posit that close partners are akin to computers in the same network using the shared server, which stores members’ uploaded memories. Further, believing the memories have been backed up to a cooperative storage obviates the need to remember the details oneself. For example, a husband relying on his wife to remember family and friends’ birthdays may not feel the need to personally remember these dates. This prediction is in line with recent findings in the transactive memory systems (TMS) literature, which suggest that relying on external storage aids such as the Internet (Sparrow, Liu, and Wegner 2011) and digital cameras (Henkel 2014) to preserve memories, may lead to poorer memories for these events. This is because consumers encode less information due to reliance on the external repository for future memory access (e.g. “I have a picture of the event and hence don’t need to remember it since I can go back to the picture any time”). I suggest a similar phenomenon occurs during social

sharing of consumption episodes such that consumers believe that their conversational partner(s) will remember the experience, thereby reducing the motivation to personally remember the experience (Wegner 1985).

I find support for my prediction across five studies manipulating different social identities - student (study 1 & 3), gender (study 2 & 4), nationality (study 5), and consumption experiences (shopping: studies 1-4, product fair experience: study 5). I also identify moderators to the forgetting-after-sharing effect in the form of perceived security of the outsourced memory, experience valence and partner type, and show that the forgetting-after-sharing is more likely when the sharing partner has good memory (study 3), the shared experience is positive rather than negative (study 4) and the partner is human rather than nonhuman (e.g. Facebook– study 5). Further, I show that while the memory attenuation after sharing does not significantly impact attitudes towards the experience, it reduces attitude confidence and strength (study 5). Thus, I identify the interactions between relationship characteristics (closeness), experience characteristics (valence, identity relevance) and partner characteristics (memory reliability) to gain a better understanding of the phenomenon of memory decay after sharing.

This research contributes to the literatures on memory and social identity in ways. First, my finding that increased rehearsal may in fact decrease memory is a novel contribution to the memory literature, which has largely supported a positive effect of rehearsal on memory (Gable et al. 2004, p. 229; Langston 1994, p. 1113; Bohn and Berntsen 2007; Tinti et al. 2014). Specifically, I examine memory outsourcing as the underlying mechanism, and social identity preservation as the driving motivation for

memory distortions; two phenomena little examined in the marketing and consumer psychology literatures.

Second, I firstly bridge the memory outsourcing research (Sparrow et al. 2011, Henkle 2014) with the social sharing literature and examine the moderating effect of identity relevance on memory outsourcing - an important yet understudied factor, and show that identity relevant information motivates memory outsourcing. Two, I document that memory decay after outsourcing can be a retrieval phenomenon as compared to the current research that has only documented forgetting due to encoding deficits. Thus, despite encoding all aspects a consumption experience, consumers may nonetheless forget these aspects after sharing the experience with a close friend/partner. Three, we add a moderator – experience type – that helps better understand the type of memories that are more likely to be outsourced (identity relevant, positive). Four, while memory outsourcing has been extensively studied in an organizational/group performance setting, I extend this literature to the domain of consumer memories and showcase the deleterious effects of outsourcing memories on downstream marketing variables such as attitudes and attitude strength.

Finally, while past research on consumers' word-of-mouth (Berger 2014) has focused on consumer perceptions, choices and preferences, the effects on consumer memories have as yet not been fully understood, and my research address this gap. My finding that sharing memories of an event may in fact attenuate consumer memory for that event suggests that social sharing may not always be beneficial to consumers and marketers alike. That is, there might be unexpected “dark sides” to memory sharing in

certain consumption settings and promoting word of mouth among close others may be detrimental to some brands.

The remainder of the paper is organized as follows. I begin by referencing relevant literatures in social identity and memory outsourcing and developing my hypotheses. I then present results from five studies testing my predictions and conclude with a summary of the contributions and implications of my research as well as ideas for future research.

### 1.3 SOCIAL SHARING AND MEMORY

Memory enhancement after sharing has been frequently documented in the learning (e.g. Wogan and Waters 1959) and the marketing literatures (e.g. Campbell and Keller 2003), with repetition enhancing memories of the repeated event (Blumen and Rajaram 2008). Such enhancement is due to several reasons. First, sharing increases rehearsal and therefore accessibility of the shared event in memory. This was documented by Blumen and Rajaram (2008) in their experiment wherein participants viewed a series of pictures and then discussed the pictures with others. This “second study opportunity” refreshed the accessibility of the pictures and improved individual recall. Second, the retelling process is believed to create a better organization of the mental representations resulting in the positive effect of increasing the understanding of the shared event via its verbalization, and such improved understanding enhances memory for the event. Finally, Rimé et al. (1998)’s work on the social sharing of emotion asserts that the feelings associated with an emotional memory can be reactivated during social sharing. Likewise, Gable et al. (2004) contend that sharing a positive event results in a reliving and re-experiencing of the event, thereby increasing its memorability.

The enhancement effect articulated above ought to be greater for identity-relevant experiences as compared to identity-irrelevant experiences since identity-relevant experiences are used to express, define and affirm consumers' self-identities (Chernev, Hamilton, and Gal 2011), and hence are likely to be more important and impactful than identity-irrelevant experiences. In this regard, identity relevance has been documented to elicit more favorable brand attitudes (Reed et al. 2012), increase product preference (Berger and Heath 2007) and generate better memory for identity-linked promotions (Mercurio and Forehand 2011). Recent research has also found that consumers remember more identity-linked information, when their identity is primed (Dalton and Huang 2014). Therefore, it seems intuitive that memory enhancement is likely to occur when identity-relevant experiences are shared. However, contrary to this intuition, I suggest that this advantage may not hold when the memory is shared with close sharing partners due to the greater likelihood of a memory cloud among close others. When there is a memory cloud to store your important memories, consumers will feel less responsible to remember those memories internally. In other words, the likelihood of backing up identity relevant memories to close sharing partners is expected to be high, thus reducing the need to remember those memories.

#### 1.4 RELATIONSHIP CLOSENESS AND MEMORY CLOUD

We have to admit that our mind has limits. As wise humans, we always seek to expand our cognitive capacity through different means- e.g. reliance on books, calendars, and computers (Storm and Stone 2015). The pursuit of cognitive efficiency stimulates consumers to extend cognition to external agents that could save and store information for them (Nestojko, Finley, and Roediger III 2013). Thus, the Internet has become a

powerful agent for storage (“Data is stored on remote servers accessed from the Internet” (Wikipedia). I suggest that just as such external objects can serve as memory storage, so too can other consumers. That is humans in close relationships can also develop a virtual memory cloud and maintain a collective cloud memory (I remember yours and you remember mine) to enhance efficiency.

Past research on transactive memory systems (TMS) provides some support for reliance on other humans as external memory storage. Studies in organizational behavior find that close group members often share responsibility for remembering events (e.g. you remember part A and I remember part B) for a better group performance (Wegner 1987). Such division of responsibilities reduces the memory burden on each individual member and enhances overall group memory. People develop a TMS when they work closely, trust each other (a safe memory storage), believe other’s specialized knowledge (knowing who knows what), and have a good coordination (access the information easily) (Liang et al. 1995). Interpersonal relationships, team training, and group member familiarity have been found to facilitate TMS development (Prichard and Ashleigh 2007). These studies suggest that intimate groups are more likely to rely on each other’s memory because of trust, perceived memory safety, and easy accessibility. Likewise, a memory cloud should be more likely to be available among close others, because such groups have a higher trust and they have a better sense of what others will remember and will be readily to help. Such shared understanding of the implicit cognitive cooperation is less likely among strangers (Hollingshead 2001).

While the memory cloud concept that I propose shares characteristics with TMS, it is also significantly different. TMS often involves formal structure (e.g. organizational

group) and clearly articulates division of labor according to each member's expertise while a memory cloud is simply an invisible memory server that develops informally among close others. It is a belief that consumers can reference each other's memories (I remember what you said and you remember what I said). The memories do not necessarily have to be relevant to one's domain knowledge, and no explicit request is required for help in remembering. The memory cloud operates in a shared belief of secure memory storage and motivates memory uploading to this server and thereby outsourcing the responsibility of remembering.

Consumers are known to share their consumption experiences with various audiences, ranging from close family members, best friends and colleagues to acquaintances and online strangers (e.g. Twitter, blogs). The social sharing is a process of memory transferring (imagine that a computer is uploading data to the server). As a result, memory can be outsourced to the memory cloud (sharer and listener's memory cloud). Hence, I suggest that in social sharing situations, when there is a memory cloud available (e.g. among close sharing partners such as best friends), people's likelihood of uploading memories - expecting that conversing partners will also remember - will be much higher than no such memory cloud available (e.g. when sharing with strangers).

### 1.5 MODERATING ROLE OF IDENTITY RELEVANCE

What kind of memories we really want to save and are more likely to backup to the memory cloud (if it is available)? Prior research suggest that special and meaningful memories are held more vivid, and confidently (Talarico and Rubin 2004). In fact, not all memories are equally meaningful and worthy of remembering. Identity relevant memories that define, express and reinforce "who we are" and are important and



meaningful for us to main self-definition. For instance, watching a university football game, attending the classical music concert, joining the cosplay party, etc. These are all the memories we desire to remember and preserve. If there is a memory cloud (server) that can save memories, we can expect that the identity relevant memories (e.g. visit a store to celebrate the university anniversary) that we cherish will be more likely to be backed up to the server than the neutral memories (e.g. visit the store as usual). Highly identity-relevant experiences are likely to be perceived as more important and impactful than experiences with low identity-relevance (Rydell, Rydell, and Boucher 2010), thereby triggering a higher felt need to protect and preserve such memories. Along these lines, “special” experiences (which are arguably identity-relevant) have been shown to be viewed as assets that require protecting (Zauberman, Ratner, and Kim 2009). Research has also found that identity-relevant experiences have been shown to be important possessions that may lead consumers to delay experiences that could weaken the link between such important memories and self-identity (Mercurio, Reed II, and Forehand 2013). Following this line of research, I suggest that the desire to protect identity relevant memories can be a driving force for memory outsourcing because saving the meaningful memories to a safe repository is a good strategy for memory protection and thereby identity preservation. Therefore, I predict that identity-relevant experiences are more likely to be outsourced than identity-irrelevant experiences.

## 1.6 MEMORY OUTSOURCING AND FORGETTING

What happens after a memory is backed up to the memory cloud? Ideally, we believe that that is an increased security (e.g. I remember and I have also backed up the information on the server). However, recent research suggests that our memory system is

very resource-rational and is always seeking to minimize “need-to-remember” information. We therefore have lower motivation to remember externally available information. Albert Einstein once said: “I do not carry such information in my mind since it is readily available in books” (Isaacson 2007), and recent research suggests the availability of the information online decreases people’s motivation to encode that information. For example, Sparrow et al. (2011) found that participants who were instructed to type information into a computer, and believed that what they typed would be saved by the computer (vs. would be erased), recalled less information because they did not feel a need to encode the information when they believed they could look it up on that computer. Relying on the digital cameras (Henkel 2014) to save memories may lead to poorer encoding for the events because of believing future memory access (e.g. “I have a picture of the event and hence don’t need to remember it since I can go back to the picture any time”). Furthermore, Storm and Stone (2015) show that saving one file before studying a new file improves memory for the new file because saving motivates offloading and therefore we have more cognitive resources to remember new information. Once the memories have been shared with close others (uploaded and backed up to the memory cloud), they become externally accessible and thus have lower need to be kept internally (allocate memory resources to information we expect to be unavailable through external means). Interesting enough, we share and we back-up important memories in order to remember them; ironically, our memory system deprioritizes those currently unneeded to-be-remembered memories, and leads to forgetting the details of it but remembering with whom you have shared. Just like in

Sparrow et al. (2011), saved information is less recalled than erased information; instead, people remember where to find the information (the folder name on the computer).

Therefore, I suggest that sharing experiences with close friends may trigger memory decay because of memory outsourcing to the memory cloud, i.e. consumers believe that there is a secure repository for their memories and hence feel relieving to let go. Thus, after the memory is shared and outsourced, details of the individual memory are replaced by a label of the memory location (e.g. “I remember I have told my best friend”), fostering a secure feeling of identity preservation, but leading to decay of memory for the details of the experience.

To summarize, I predict that consumers will backup memories of their consumption experiences to sharing partners such that memory outsourcing are more (less) likely for identity-relevant (identity-irrelevant) experiences with close (distant) relationship partners and that memories for such saved experiences will attenuate as compared to unsaved experiences.

## 1.7 STUDY 1

The objective of study 1 was to examine the interaction of identity-relevance and sharing partner on memory for the shared experience. Two hundred and sixty undergraduate students from an American university participated in a 2 (identity-relevance: high vs. low) x 3 (shared with close friend vs. acquaintance vs. no-sharing) between-subjects study in exchange for course credit. They read a shopping scenario, which was either relevant or irrelevant to a student identity, and were instructed to write down a conversational script for recounting their experience to their best friend/new classmate or to write down the description of a movie or a book that they liked (no

sharing condition). The writing task was included to ensure that the control condition respondents had a task similar to the experimental condition thereby ruling out differences in cognitive resources as an alternate explanation for our findings. Since my research purpose is to establish that the act of sharing can lead to memory outsourcing and therefore memory decay, I want to control other potential factors that may also contribute to the memory decay (e.g. variances in the sharing amount, the sharing goal). Thus, after the same encoding, I gave them the instruction to share as many details of the experience as possible so that their sharing goal of being accuracy should be identical. I measure the time spent on the sharing task and the word counting of the sharing content. They then participated in several unrelated studies for about 20 minutes prior to recalling their shopping experience.

I used two different measures of recall: cued recall and corrected recognition. Cued recall was measured by asking respondents 5 specific questions about the scenario (“where did you go”, “what did you buy” (three different items were bought), “how many hours did you spend”, “how much were the shoes”, and “when did you get the catalog”). Each response was coded as 1 = correct and 0 = incorrect. Thus, the maximum possible score for the cued recall measure was 5. Recognition measure comprised a set of 20 items, of which 10 were accurate pieces of information used in the scenario (e.g. spent 3 hours in the mall) and 10 were filler items that were not used in the scenario (e.g. spent 5 hours in the mall). I computed corrected recognition by subtracting the number of filler items selected from the number of correct items selected (Dalton and Huang 2014); thus the recognition measure could potentially range from -10 to 10.

### 1.7.1 PRETEST OF STUDENT IDENTITY MANIPULATION

Prior to the main study, I conducted a pretest of our identity relevance manipulation. Forty-five American Amazon Mechanical Turk (MTurk) workers were randomly assigned to one of two conditions (identity relevant vs. irrelevant) in a between-subjects design. Following Coleman and Williams (2013), participants were instructed to either “Think about the ways you would show someone else that you were a university student. Please think about behaviors you would do and steps you would take to demonstrate that you were a university student. Please show at least 3 behaviors you would show” (identity relevant condition) or “List at least 3 things that you plan to do tomorrow” (identity irrelevant condition). To further make the identity relevant to a shopping experience, participants in identity relevance condition read “At the beginning of the year, there are usually big sales in a lot of stores, some of which offer special discounts to university students. As a university student, you can enjoy saving by showing your university student ID card.” In contrast, participants in identity irrelevant condition read “At the beginning of the year, there are usually big sales in a lot of stores. People say that winter (especially from November to February) is the best season for shopping.” After these manipulation procedures, all the participants were direct to an imaginary shopping experience scenario. The details of a one-day shopping event were described (e.g. stores visited, brands considered). Respondents then indicated their opinions on a 7-point identity relevance scale (1 “strongly disagree” to 7 “strongly agree”; adopted from Berger and Heath (2007)), reported perceptions of scenario validity, their task involvement and demographics (e.g. age, gender) before being debriefed and paid.

An analysis of variance confirmed the successful manipulation of identity relevance ( $M_{\text{relevant}} = 4.30$  vs.  $M_{\text{irrelevant}} = 3.17$ ,  $F(1, 44) = 7.69$ ,  $p < .01$ ), with no differences on perceptions of scenario validity or reported task involvement ( $p$ 's  $> .1$ ).

### 1.7.2 RESULTS

I expected to find worse (better) recall when the identity relevant (irrelevant) experience was shared with a close friend as compared to an acquaintance, suggesting an interaction between identity-relevance and relationship partner. This is because the identity relevant experience ought to increase motivation to save them to the memory cloud and the presence of the close friend ought to enhance the availability of a memory cloud.

*Analysis of the Sharing Content.* Because my research focus is to test when people share the same amount of information, will their post-sharing memories vary depending on thinking of whom they have shared with and what kind of experience they shared, I first ensured that there were no differences with respect to the sharing content. An analysis of variance confirmed that there was no significant interaction between sharing partner and identity relevance on time spent on the sharing task ( $F(2, 254) = 1.40$ ,  $p > .24$ ) and the total number of words typed ( $F(2, 254) = 1.08$ ,  $p > .34$ ). In particular, I checked the interaction of the two independent variables on how much detailed information in the scenario was shared (in the best friend and new classmate conditions) and found no significant interaction ( $F(1, 168) = .20$ ,  $p > .66$ ). Thus, I can be confident that the memory effects I find are not due to the differences in the encoding or sharing process.

*Cued Recall.* An analysis of variance revealed a significant main effect of sharing partner ( $F(2, 254) = 3.59, p < .03$ ) and the expected significant interaction between the sharing partner and identity relevance ( $F(2, 254) = 15.4, p < .001$ ). Consistent with the free recall results, participants in the high identity relevant condition recalled less information when the sharer was a best friend as compared to a new classmate and the no-sharing ( $M_{\text{best\_friend}} = 4.88, M_{\text{newclassmate}} = 6.16, M_{\text{no-sharing}} = 5.51; F(2, 254) = 7.57, p < .01$ ), supporting our contention that memory would be negatively impacted, while participants in the low identity relevance condition recalled more information when sharing with a best friend as compared to sharing with a new classmate and no-sharing ( $M_{\text{best\_friend}} = 6.33, M_{\text{newclassmate}} = 5.32, M_{\text{no-sharing}} = 4.78; F(2, 254) = 11.6, p < .001$ ). Cued recalls when sharing with best friend ( $p < .001$ ) and new classmate ( $p = .10$ ) were higher than no-sharing, which is consistent with prior memory literature of memory enhancement effect after rehearsal.

*Corrected Recognition of Shopping Experience.* An analysis of variance revealed a marginally significant main effect of sharing partner ( $F(2, 254) = 2.75, p < .07$ ) and the expected significant interaction between sharing partner and identity-relevance on corrected recognition ( $F(2, 254) = 13.0, p < .001$ ). Planned contrasts revealed that for highly identity-relevant experiences, consumers forgot more after sharing their experience in the best friend condition as compared to the new classmate condition and no-sharing condition ( $M_{\text{best\_friend}} = 5.72, M_{\text{newclassmate}} = 7.75, M_{\text{no-sharing}} = 6.86; F(2, 254) = 7.49, p < .01$ ). When student identity was made relevant, the corrected recognition of the experience shared with close friend condition was significantly lower than the no-sharing condition ( $p < .04$ ) and new classmate condition ( $p < .001$ ). These findings support my

contention that sharing highly identity-relevant experiences result in poorer memory when shared with close others. This is an intriguing finding since it suggests that the decay in memory due to outsourcing negates any enhancement effects of the additional rehearsal due to sharing. In other words, despite respondents in the sharing condition rehearsing the experience while sharing, they still recalled less information than respondents in the no-sharing condition, who did not enjoy such a rehearsal advantage.

However, for low identity-relevant experiences, respondents remembered more details in the best friend condition than classmate condition ( $M_{\text{best\_friend}} = 8.00$ ,  $M_{\text{newclassmate}} = 6.71$ ,  $M_{\text{nosharing}} = 5.87$ ;  $F(2, 254) = 8.43$ ,  $p < .001$ ). Notably, both sharing conditions (no matter with best friend ( $p < .001$ ) or new classmate ( $p = .10$ )) showed better memories than no-sharing condition, which is consistent with the previous memory literature of memory enhancement after rehearsal.

While corrected recognition was my primary measure of interest, I also analyzed total recognition and false recognition to examine if there were differences on these measures.

*Total Recognition of Shopping Experience.* An analysis of variance revealed a significant main effect of sharing partner ( $F(2, 254) = 4.49$ ,  $p < .02$ ) and an interaction between sharing partner and identity-relevance on total recognition ( $F(2, 254) = 12.7$ ,  $p < .001$ ). Planned contrasts revealed that for highly identity-relevant experiences, consumers forgot more after sharing their experience in the best friend condition as compared to the new classmate condition and no-sharing condition ( $M_{\text{best\_friend}} = 7.21$ ,  $M_{\text{newclassmate}} = 8.59$ ,  $M_{\text{nosharing}} = 7.84$ ;  $F(2, 254) = 6.87$ ,  $p < .01$ ). However, for low identity-relevant experiences, respondents remembered more details in the best friend



condition than the other two conditions ( $M_{\text{best\_friend}} = 8.72$ ,  $M_{\text{newclassmate}} = 7.81$ ,  $M_{\text{nosharing}} = 7.02$ ;  $F(2, 254) = 10.5$ ,  $p < .001$ ). Both sharing conditions (no matter with best friend ( $p < .001$ ) or new classmate ( $p < .04$ )) showed better memories than no-sharing condition, replicating the memory enhancement effect after rehearsal.

*False Recognition.* An analysis of variance revealed a significant interaction of sharing partner and identity relevance on false recognition ( $F(2, 254) = 12.7$ ,  $p < .001$ ). Planned contrasts showed that participants in the high identity relevant conditions reported greater false memories when the sharer was a best friend as compared to a new classmate and no-sharing ( $M_{\text{best\_friend}} = 1.48$ ,  $M_{\text{newclassmate}} = .84$ ,  $M_{\text{nosharing}} = .98$ ;  $F(2, 254) = 4.11$ ,  $p < .02$ ), while participants in the low identity relevance condition did not report significantly different levels of false recognition among the conditions ( $M_{\text{best\_friend}} = .72$ ,  $M_{\text{newclassmate}} = 1.10$ ,  $M_{\text{nosharing}} = 1.16$ ;  $F(2, 254) = 1.96$ ,  $p > .14$ ). These findings suggest that memory errors were greater when the identity-relevant experience was shared with a best friend rather than an acquaintance or no-sharing thereby leading to poorer memory in this condition.

### 1.7.3 DISCUSSION

Study 1 shows an intriguing forgetting effect of social sharing. My results suggest that when sharing general (e.g. low identity relevant) information with a distant audience (e.g. a new classmate), sharing indeed can strengthen memory through the additional rehearsal, thus replicating past findings documenting memory enhancement. However, when the sharing partner is close (memory cloud is available), identity relevance ought to motivate consumers to backup the memory they desire to save to the memory cloud, and the feeling of saving subsequently leads to forgetting the details of such memory.

Further, the patterns of recognition suggest that forgetting the outsourced memories occurs due to lower recognition for the details of the experience (i.e. lower total recognition) as well as a larger number of errors in recognition the details (i.e. greater false recognition). Thus, outsourcing memories appears to result in remembering less as well as remembering worse.

## 1.8 STUDY 2

Study 2 extends the findings from study 1 in several ways. First, I use a gender identity rather than a student identity and a non-student adult sample to generalize our results. Second, I added a condition wherein I informed respondents in advance that they would share their experience with a best friend. Adding this condition allowed me to test if the forgetting-after-sharing effect is due to errors at encoding versus retrieval. If being informed in advance that they would share the experience resulted in forgetting as compared to when not so informed, then it suggests an encoding disadvantage while if I found no differences between the two sharing conditions, it suggests a retrieval disadvantage. Third, I increased the delay between exposure to the scenario and recall of the experience to 48 hours for a more conservative test of my hypotheses.

### 1.8.1 PRETEST OF GENDER IDENTITY MANIPULATION

To develop a gender identity relevance manipulation for non-student adult samples, I modified the identity relevance manipulation used by Berger and Heath (2007) and made it appropriate for different genders- *“Sometimes people believe that their shopping experience can express what type of person they are (e.g. masculine or feminine) because where to shop and what to buy often signal one's personal tastes and lifestyles. People can form an impression and make judgments about who you are from*

*your shopping experience. The shopping experience below can therefore express who you are to the people around you.*” In addition, a control condition without any identity prime only mentioned they would read a shopping scenario in a mall. Thirty MTurk workers participated in this pretest in return for monetary compensation (50 cents). They were randomly assigned to two conditions (high identity relevance vs. control). After reading the manipulation, they read a shopping scenario and reported their perceptions of identity relevance ( $\alpha = .925$ ) and demographics (age, gender). An analysis of variance showed a significant difference on identity relevance perception ( $M_{\text{identity}} = 4.51$   $M_{\text{control}} = 2.98$ ;  $F(1,29) = 5.08, p < .04$ ), confirming a successful manipulation of identity relevance.

#### 1.8.2 PARTICIPANTS, DESIGN AND PROCEDURE

One hundred and fifty eight American MTurk workers participated in a 2 (gender identity vs. control) x 2 (informed about sharing with close friend vs. not informed about sharing with close friend vs. no-sharing) between-subjects study in return for monetary compensation (55 cents). After the identity manipulation, and before they read the shopping experience, participants were randomly assigned to the three sharing conditions. In the informed about sharing condition, participants were told “Next you will read a scenario about your shopping experience in a mall. You will be asked to tell your best friend about this experience later.” In the not informed about sharing condition and control condition, they read “Next you will read a scenario about your shopping experience in a mall.” After reading the shopping scenario, participants were either asked to share the experience in detail with a best friend (sharing conditions) or to write down the description of a movie or a book that they liked (no-sharing condition). Finally, participants responded to a cued recall measure by answering 10 questions about the

shopping experience (e.g. where did you go shopping?). Thus, the cued recall measure ranged from -10 to 10. I included the cued recall measure to capture potential differences in encoding of the shopping information across conditions.

Forty-eight hours after completing the first survey, all participants were contacted for an online follow-up study about their memory of this shopping experience. Corrected free recall of the experience constituted our dependent measure, and was computed by subtracting false recall from total correct recall. Two coders unaware of the experimental conditions coded the data. Inter-rater agreement was 95% and was resolved through discussions.

### 1.8.3 RESULTS

*Immediate Cued Recall.* An analysis of variance revealed a non-significant interaction of identity relevance and sharing on immediate cued recall ( $F(2,152) = 1.45, p > .23$ ). Planned contrasts revealed no significant simple effect of sharing within identity relevant ( $F(2,152) = .44, p > .64$ ) or control conditions ( $F(2,152) = 2.27, p > .11$ ). There were no significant differences between the two sharing conditions when gender identity was made relevant ( $M_{\text{informed}} = 5.10, M_{\text{not\_informed}} = 4.57, p > .38$ ) or when it was not ( $M_{\text{informed}} = 5.04, M_{\text{not\_informed}} = 4.52, p > .42$ ). The lack of difference between the informed in advance about sharing and not being informed conditions suggests that the decrease in memory for the shopping experience is not due to encoding differences, but rather differences in retrieval. Thus, respondents in both the sharing conditions encoded similar amounts of correct information about the shopping experience.

*Delayed Corrected Free Recall.* An analysis of variance revealed a significant main effect of identity relevance ( $F(1, 152) = 4.61, p < .04$ ) such that recall was greater

in the identity relevant condition. Importantly, I also found the expected interaction of identity relevance and sharing on corrected free recall ( $F(2,152) = 9.09, p < .001$ ).

Planned contrasts revealed that when gender identity was made relevant, there were no significant differences between the two sharing conditions ( $M_{\text{informed}} = 2.03, M_{\text{not\_informed}} = 2.21, p > .75$ ) but both conditions were marginally significantly lower than the no sharing condition ( $M_{\text{no\_sharing}} = 3.22; F(2,152) = 2.39, p < .10$ ).

In the control condition (no identity prime), there were no differences between the two sharing conditions ( $M_{\text{informed}} = 4.25, M_{\text{not\_informed}} = 3.57, p > .26$ ), but they both reported better memory than the no-sharing condition ( $M_{\text{no\_sharing}} = 1.91, p's < .02$ ). These results also replicate our findings from study 1 and provide further support for the moderating role of identity-relevance in transacting memories.

*Delayed Total Free Recall.* An analysis of variance revealed an expected interaction of identity relevance and sharing on total free recall ( $F(2,152) = 8.01, p < .001$ ). Planned contrasts revealed that when gender identity was made relevant, there were no significant differences between the two sharing conditions ( $M_{\text{informed}} = 2.67, M_{\text{not\_informed}} = 2.71, p > .92$ ) but both conditions showed worse recall than the no sharing condition ( $M_{\text{no\_sharing}} = 3.44$ ). In the control condition (no identity prime), there were no differences between the two sharing conditions ( $M_{\text{informed}} = 4.50, M_{\text{not\_informed}} = 3.74, p > .18$ ), but they both reported better memory than the no-sharing condition ( $M_{\text{no\_sharing}} = 2.18, p's < .02$ ).

*Delayed False Recall.* Although the interaction of social sharing and identity relevance on false recall was not significant level ( $p = .16$ ), planned contrasts revealed patterns consistent with our expectations. The simple main effect of sharing was

significant in the identity relevant conditions ( $F(2,152) = 3.16, p < .05$ ) but not for the control conditions ( $p > .85$ ). Specifically, sharing the shopping experience with a best friend lead to a higher incidence of false memories as compared to the no-sharing condition. There were no significant differences between the two sharing conditions ( $p > .66$ ) or the control conditions ( $p's > .5$ ).

#### 1.8.4 DISCUSSION

The results of study 2 replicate and extend the results of study 1 by documenting memory decay for identity-relevant information after sharing with close others, regardless of prior knowledge about future sharing the experience. These results support retrieval-based forgetting of identity-relevant information, rather than encoding-based forgetting as the mechanism for our results. The lack of any significant differences between the two identity relevant sharing conditions immediately after being exposed to the scenario suggests that the respondents encoded the experience similarly. Further, the results suggest that the act of sharing is critical to initiating memory outsourcing. Once shared, the identity-relevant memory can be outsourced to a collective repository-memory cloud (i.e. best friend). In the absence of sharing, memory outsourcing processes do not appear to be triggered, resulting in the rehearsal advantage to sharing and thereby improved memory for the experience. Intriguingly, the differences in memory between the sharing and no-sharing conditions suggests that the effect of memory outsourcing can go beyond just eliminating a rehearsal advantage and actually decrease memory compared with a no-rehearsal (i.e. No-sharing) condition.

In study 3, I added another sharing condition- best friend with poor memory - to test whether memory cloud truly underlie these effects. Since I posit that the memory

decay after sharing with close others is due to reliance on a safe memory cloud, forgetting ought to be mitigated if the sharing partner is perceived to have poor memory, rendering them an unsecure repository.

### 1.9 STUDY 3

Ninety-three undergraduate students in an American university participated in a 2 (identity-relevance: high vs. low) x 3 (sharing with new classmate vs. best friend vs. best friend with poor memory) between-subjects study in return for course credit. The identity prime, dependent variables and study procedures were similar to study 1, with the exception of the addition of recognition as a dependent measure. Our recognition measure comprised a set of 20 items, of which 10 were accurate pieces of information used in the scenario (e.g. spent 3 hours in the mall) and 10 were filler items that were not used in the scenario (e.g. spent 5 hours in the mall ). We computed corrected recognition by subtracting the number of filler items selected from the number of correct items selected (Dalton and Huang 2014); thus our recognition measure could potentially range from -10 to 10.

#### 1.9.1 RESULTS

*Corrected Free Recall.* An analysis of variance revealed a marginally significant main effect of identity relevance ( $F(1, 87) = 2.85, p < .10$ ) with the highly relevant experience recalled more than the low identity relevance experience. Importantly, I also found the expected significant interaction between identity-relevance and sharing partner on corrected recall ( $F(2, 87) = 9.07, p < .001$ ). In line with my predictions, sharing with a best friend who has poor memory also resulted in memory enhancement rather than decay. For the high identity-relevance experience, respondents correctly recalled more of

the experience when it was shared with a classmate than the other two conditions ( $M_{best\_friend} = 1.08$ ,  $M_{newclassmate} = 4.40$ ,  $M_{friendwithpoormemory} = 2.95$ ;  $F(2, 87) = 6.03$ ,  $p < .01$ ). Interestingly, the differences among all three conditions were significant (Best friend vs. New classmate ( $p < .01$ ); Best friend vs. Best friend with poor memory ( $p < .05$ ); New classmate vs. Best friend with poor memory ( $p = .10$ ). Thus, memory impairment of the best friend did attenuate the memory decay, but not to the same extent as sharing with a new classmate.

For the low identity relevance experience, consumers forgot marginally more in the new classmate and best friend with poor memory conditions than the best friend condition ( $M_{best\_friend} = 3.18$ ,  $M_{newclassmate} = 1.06$ ,  $M_{friendwithpoormemory} = 1.50$ ;  $F(2, 87) = 2.63$ ,  $p < .08$ ), suggesting that the memory impairment of the best friend rendered them similar to a distant partner (new classmate).

*Total Free Recall.* An analysis of variance revealed a significant main effect of identity relevance ( $F(1, 87) = 4.43$ ,  $p < .04$ ) with the high identity-relevant experience recalled more than the low identity-relevant experience. Importantly, I also found the expected significant interaction between identity-relevance and sharing partner ( $F(2, 87) = 7.06$ ,  $p < .01$ ). In line with my predictions, sharing with a best friend who has poor memory resulted in memory enhancement rather than decay. For the high identity-relevance experience, respondents correctly recalled more of the experience when it was shared with a classmate than the other two conditions ( $M_{best\_friend} = 1.85$ ,  $M_{newclassmate} = 4.40$ ,  $M_{friendwithpoormemory} = 3.32$ ;  $F(2, 87) = 4.67$ ,  $p < .02$ ). Sharing with best friend yielded lower recall than sharing with new classmate ( $p < .01$ ) or sharing with best friend with



poor memory ( $p < .07$ ). However, sharing with new classmate and sharing with best friend with poor memory did not differ significantly ( $p > .15$ ).

For the low identity relevance experience, consumers forgot marginally more in the new classmate and best friend with poor memory conditions than the best friend condition ( $M_{best\_friend} = 3.24$ ,  $M_{newclassmate} = 1.65$ ,  $M_{friendwithpoormemory} = 1.75$ ;  $F(2,87) = 2.63$ ,  $p < .08$ ), suggesting that the memory impairment of the best friend rendered them similar to a distant partner (new classmate).

*False Recall.* An analysis of variance on false recall revealed a marginally significant interaction between identity-relevance and sharing partner on false recall ( $F(2, 87) = 3.07$ ,  $p < .06$ ). In line with expectations, sharing the highly identity relevant experience with a best friend elicited higher false recall ( $M_{best\_friend} = .77$ ) than sharing with either a classmate ( $M_{newclassmate} = .07$ ) or best friend with impaired memory ( $M_{friendwithpoormemory} = .53$ , ( $F(2,87) = 2.76$ ,  $p < .07$ ). There were no significant differences in false recall in the low identity relevant conditions ( $p$ 's  $> .1$ ). These findings are consistent with my predictions that memories of the identity relevant experience will be more accurate when sharing with a classmate than best friend, but that this effect will be attenuated when the best friend has poor memory.

*Corrected Recognition.* An analysis of variance revealed marginally significant main effects of sharing partner ( $F(2,87) = 2.61$ ,  $p < .08$ ) and identity relevance ( $F(1,87) = 3.71$ ,  $p < .06$ ) and but also the expected interaction between identity-relevance and sharing partner on corrected recognition ( $F(2,87) = 7.28$ ,  $p < .01$ ). As expected, sharing with a best friend who has poor memory resulted in memory enhancement rather than decay. For the high identity-relevance experience, respondents correctly recognized more

of the experience when it was shared with a classmate than the other two conditions ( $M_{best\_friend} = 2.38$ ,  $M_{newclassmate} = 5.73$ ,  $M_{friendwithpoormemory} = 3.32$ ;  $F(2, 87) = 8.63$ ,  $p < .001$ ). The differences in identity irrelevant conditions were not significant ( $p > .47$ ).

### 1.9.2 DISCUSSION

The results of study 3 replicate and extend my findings from studies 1 and 2 and provide evidence consistent with the reliance on a safe memory cloud as the underlying mechanism for the memory decay effects. Thus, I replicated the forgetting-after-sharing effect when secure memory cloud was available (i.e. best friend), but when there was no secure memory cloud (i.e. best friend with poor memory), memory for the identity-relevant experience was less impaired, and the memory decay effect was attenuated. These findings are consistent with my contention that close relationship partners elicit perceptions of safe repositories for identity relevant memories, thereby initiating memory outsourcing leading to forgetting. However, when safety perceptions are threatened, reliance on the repository is not desirable, thereby attenuating forgetting.

While studies 1-3 consistently provide evidence for the outsourcing of identity-relevant experiences to close relationship partners, there are several limitations of these studies. One, only positive experiences were examined in these studies whereas in reality, consumers share both positive and negative experiences (Rimé et al. 1992). Hence, in study 4 I include a negative experience to examine if memory decay after outsourcing extends to negative experiences. Prior research has documented systematic differences between memories for positive versus negative information. Thus, some research has documented that negative information is more memorable than positive information (Kensinger 2007) because of greater attention, elaboration, distinctiveness, and rehearsal

(Christianson 1992; Kensinger 2007; Loftus 1993; Ochsner 2000) for negative information. Other research has shown that a primary objective of remembering negative experiences is to learn from these experiences in order to avoid re-experiencing them (Rasmussen and Berntsen 2009). This suggests that it would be important for consumers to personally remember negative experiences. Furthermore, sharing negative experiences with close partners activate a motive to protect others by warning them about potential cons of products and services (Dubois, Bonezzi and Angelis 2016). Storm and Stone (2015) point out that our memory system keeps track of the currently unneeded information and releases the cognitive capacity. Taken together, when people share negative experiences with close others, they will upload to the memory cloud but not delete the copy stored internally because remembering it personally is the best way to protect self. That is, the double-security mode (I remember and you remember) may even strengthen the memories of the negative experience shared with close others as compared to a single security-mode (I remember) when shared with a stranger. I therefore predict that the memory decay effect should be attenuated for negative experiences as compared to positive experiences.

A second limitation of the previous studies is that I do not examine the consequences of the memory outsourcing on subsequent evaluations of the experience. I therefore included a measure to capture consumers' perceived enjoyment of the shopping experience in study 4.

## 1.10 STUDY 4

### 1.10.1 PRETEST OF NEGATIVE SHOPPING EXPERIENCE

To validate the manipulation of valence for our main study, sixty-eight MTurk participants were randomly assigned to either a negative or a positive shopping scenario. Similar to study 2, gender identity was manipulated before exposure to the shopping scenario. The dependent measures included identity relevance ( $\alpha = .88$ ), valence (overall feeling of this shopping experience from “1=very unhappy, very unpleasant, very unenjoyable to 7= very happy, very pleasant, very enjoyable;  $\alpha = .97$ ).

An analysis of variance showed the expected significant difference on the valence measure ( $M_{\text{positive}} = 5.15$  vs.  $M_{\text{negative}} = 2.28$ ;  $F(1, 67) = 85.6, p < .001$ ) with no differences on perceived identity relevance ( $p > .2$ ). Thus, regardless of experience valence, participants perceived the scenario as equally relevant to their gender identity.

### 1.10.2 PARTICIPANTS, DESIGN AND PROCEDURE

Two hundred and nine American MTurk participants completed the main study for monetary compensation (55 cents). The study was a 2 (sharing partner: best friend vs. new neighbor) x 2 (experience valence: positive vs. negative) between-subjects study. Respondent gender was measured at the beginning of the survey to enable us to assign men versus women respondents randomly to a positive or negative shopping experience relevant to their gender. After reading the scenario, they were encouraged to share this experience with a best friend or a new neighbor. Forty-eight hours later, they were asked to recall this shopping experience in as much detail as possible. Our dependent measures included corrected free recall, corrected recognition (maximum possible score of 10), and

perceived enjoyment of the experience (What is your overall feeling about your shopping experience? ---Happy/Pleasant/Enjoyable;  $\alpha = .97$ ).

### 1.10.3 RESULTS

Based on my theorizing, I expected to find an interaction between sharing and valence such that corrected recall, corrected recognition and enjoyment of the experience were all greater (lower) when the positive (negative) experience was shared with a new neighbor than a best friend.

*Corrected Free Recall.* An analysis of variance revealed a significant main effect of valence ( $F(1, 205) = 6.18, p < .02$ ) such that the negative experience ( $M_{\text{negative}} = 3.08$ ) was recalled better than the positive experience ( $M_{\text{positive}} = 2.42$ ). Importantly, I found the expected interaction between valence and sharing partner ( $F(1, 205) = 8.24, p < .01$ ). Planned contrasts revealed a simple main effect of sharing partner such that the positive experience was recalled better when shared with a new neighbor than with a best friend ( $M_{\text{bestfriend}} = 2.06$  vs.  $M_{\text{newneighbor}} = 2.78$ ;  $F(1, 205) = 3.78, p < .06$ ), thus replicating my previous findings. However, the reverse was found for the negative experience such that sharing the experience with a best friend led to memory enhancement as compared to sharing with a new neighbor ( $M_{\text{bestfriend}} = 3.48, M_{\text{newneighbor}} = 2.68, F(1, 205) = 4.46, p < .04$ ), thereby supporting my prediction that saving negative experiences externally will not obviate the need to remember it internally because we may use the negative experience to avoid further repetitions.

*Corrected Recognition.* An analysis of variance revealed a significant main effect of valence ( $F(1, 205) = 11.5, p < .01$ ) such that the negative experience ( $M_{\text{negative}} = 5.22$ ) was better recognized than the positive experience ( $M_{\text{positive}} = 3.64$ ). Importantly, I found a

marginally significant interaction between valence and sharing partner ( $F(1, 205) = 3.71$ ,  $p < .06$ ). Planned contrasts revealed that sharing positive experience with a best friend resulted in directionally lower recognition than sharing it with a new neighbor ( $M_{\text{bestfriend}} = 3.22$  vs.  $M_{\text{newneighbor}} = 4.05$ ;  $F(1, 205) = 1.60$ ,  $p > .20$ ), but sharing the negative experience with a best friend lead to directional memory enhancement as compared to sharing with a new neighbor ( $M_{\text{bestfriend}} = 5.71$ ,  $M_{\text{newneighbor}} = 4.73$ ,  $F(1, 205) = 2.12$ ,  $p > .14$ ). These findings support my view that negative experiences are less likely to be subject to the forgetting-after-sharing effect.

*Perceived Enjoyment of the Experience.* I found a significant main effect of valence ( $F(1, 205) = 204.6$ ,  $p < .001$ ) such that the positive experience ( $M = 5.59$ ) was enjoyed more than the negative experience ( $M = 2.73$ ). Importantly, I also found a significant interaction between sharing and valence on perceived enjoyment of the shopping experience ( $F(1, 205) = 6.22$ ,  $p < .02$ ). Planned contrasts revealed that people reported that the negative experience was more enjoyable after sharing it with a best friend as compared to sharing it with a new neighbor ( $M_{\text{bestfriend}} = 3.08$ ,  $M_{\text{newneighbor}} = 2.38$ ,  $F(1, 205) = 6.01$ ,  $p < .02$ ). These findings are consistent with the social sharing of emotion literature that people experienced emotional relief after sharing negative emotion with close others. While respondents reported greater enjoyment for the positive experience after sharing with a new neighbor ( $M = 5.74$ ) than a best friend ( $M = 5.44$ ), this difference was not significant ( $F(1, 205) = 1.13$ ,  $p > .28$ ). Thus, I only found directional support for my prediction that the positive experience would be enjoyed less after being shared with a best friend than a new neighbor.

*Mediating Role of Corrected Free Recall.* To test whether the corrected free recall mediated the interactive effect of sharing and valence on perceived enjoyment of the shopping experience, we performed Hayes' (2014) PROESS macro with 5,000 bootstrapped samples using model 8. As predicted, the indirect effect of sharing X valence through corrected free recall on perceived enjoyment was significant ( $B = .1550$ ,  $SE = .0921$ ), with a 95% bias-corrected confidence interval that excluded 0 (.0181 to .3919). I thus concluded that corrected free recall mediated the interactive effect of sharing and valence on perceived enjoyment. To test the indirect pathway from sharing to perceived enjoyment via corrected free recall at each level of valence, I considered the bias-corrected 95% confidence intervals for the conditional indirect effects. Because this interval excluded zero in the positive experience condition (95% [CI] = .0017: .2364;  $B = .0763$ ,  $SE = .0554$ ) and excluded zero in the negative experience condition (95% [CI] = -.2363: -.0039;  $B = -.0814$ ,  $SE = .0550$ ), I thus concluded that corrected free recall mediated the effect of sharing on both positive and negative valence conditions.

#### 1.10.4 DISCUSSION

Study 4 suggests that sharing identity relevant experiences with close others may not always lead to forgetting; valence of the experience moderates the memory cloud effect. When the experience is negative and people therefore have high motivation to remember the memory personally, sharing does not lead to memory decay. These findings add to the memory outsourcing literature by exploring the role of the nature of the outsourced content and how its valence can impact the outsourcing outcome. Interestingly, the results also extend work on social sharing of emotions by suggesting that while sharing negative experiences with others might reduce the emotional intensity

of the event (Rimé et al. 1992), such sharing may also strengthen memory for these events (e.g. I feel better but I didn't forget it).

Study 4 also provides a better understanding of the link between the forgetting-after-sharing and perceived enjoyment of the experience. While consumers forget more details of the experience, their perceived enjoyment showed the reverse patterns. These results suggest that memory outsourcing, and thereby memory decay may not affect the evaluation of the shared experience. This is a puzzling finding since prior research has found a positive correlation between memory and attitudes, i.e. better memory leads to more favorable attitudes (Alba and Chattopadhyay 1986).

In this regard, Nestojko et al. (2013) find that internally stored memories are easier to retrieve than externally stored memories. Thus, when people outsource memories to external storage aids (e.g. best friend, Google), they need to remember some information to retrieve these memories (e.g. the label/keywords of the location), hindering the accessibility of the memories per se. That is, memory outsourcing may lead to differences in the accessibility of verbatim memory, but not gist memory (Reyna and Kiernan 1994). Since accessibility is an important indicator of attitude strength (Fazio 1995), it is likely that consumers' attitude strength will be diluted due to this diminished memory accessibility after memory outsourcing. Therefore, I predict that the forgetting-after-sharing effect will lead to lowered attitude strength towards the object of the shared experience. However, memory outsourcing may not impact attitude favorability which may be based on subjective overall remembering (i.e. gist of the experience), rather than actual memory details (i.e. verbatim memory). I examine this prediction in study 5.



Further, I incorporate a process measure of perceived memory saved to more conclusively document that memory outsourcing underlie our effects. I also utilize a new context in study 5 to further generalize our findings – product related electronics fair experience. Finally, I also explore social sharing on the most popular social media platforms-Facebook and Twitter. With the immersion of technology in our daily lives, consumers have been increasingly sharing their experiences on social media (Carlson and Shontell 2013), raising the interesting question of whether social media is similar to human partners in terms of the forgetting-after-sharing effect. Because Facebook is a technological social platform, it is both safe (for recording information) and has close relationships (connect with many close friends), I expect the forgetting-after-sharing effect will be amplified when shared identity relevant experiences on Facebook. However, people usually have many unknown followers on Twitter, making the relationships less close on Twitter as compared to those on Facebook (Towns 2016). Therefore, I expect that Facebook may function similar to best friend and Twitter act like acquaintance.

## 1.11 STUDY 5

### 1.11.1 PARTICIPANTS, DESIGN AND PROCEDURE

One hundred and fifty-one American MTurk workers participated in a 2 (identity relevance: high vs low) x 3 (sharing partner: best friend vs. Facebook vs. Twitter) between subject study for monetary compensation (55 cents). American nationality identity was manipulated by going to a high-tech fair on the Independent Day (vs. a public holiday) and visiting a booth by American firm (vs. a Japanese firm). They received the brochure with the detailed introduction of a new product (a portable

translator). The article included detailed information about the product - a wearable translator (e.g. features, functions, languages, battery, price, launch date). Respondents were then asked to either share details from the article with a best friend, or to post the details on Facebook or Twitter. Subsequently, after a filler task, they were asked to identify the correct information about the new product from a set of statements that included 15 correct statements and 15 false statements. Corrected recognition was computed by deducting false identification from correct identification and formed one of our dependent measures that could potentially range from -15 to 15.

In addition I measured attitude towards the product using a 3-item scale (favorable, desirable, like;  $\alpha = .97$ ), purchase intention (single item scale) and two measures of attitude strength - brand name accessibility and attitude confidence. Brand name accessibility was measured by recording the time taken to recall the brand name of the product (brand name was one of the recognition statements). The attitude confidence measure was adapted from Krosnick and Smith (1994) (confident, strong, certain, firm, definite;  $\alpha = .97$ ).

The perceived memory safety measure was adapted from past research (Sparrow et al. 2011) and consisted of 3 items ( $\alpha = .97$ ; “What do you think about the memories that you share just now.... saved/stored/protected?” All measures used 7-point scales.

#### 1.11.2 RESULTS

*Corrected Recognition.* An analysis of variance revealed a significant interaction between sharing partner and identity relevance on the corrected recognition of the product experience ( $F(2, 145) = 13.3, p < .001$ ). When the product was identity relevant (American), participants forgot more details of the brand news after sharing it with a best

friend than sharing it on Facebook ( $p < .04$ ) or Twitter ( $p < .01$ ;  $M_{\text{best\_friend}} = 4.59$ ,  $M_{\text{Facebook}} = 6.83$ ,  $M_{\text{Twitter}} = 7.88$ ;  $F(2, 145) = 5.38$ ). Sharing on Facebook versus Twitter yielded no significant memory difference ( $p > .32$ ).

However, when the product was identity irrelevant (Japanese), participants remembered more details when sharing with a best friend than sharing it on Facebook ( $p < .01$ ) or Twitter ( $p < .01$ ;  $M_{\text{best\_friend}} = 8.12$ ,  $M_{\text{Facebook}} = 4.52$ ,  $M_{\text{Twitter}} = 4.48$ ;  $F(2, 145) = 8.31$ ,  $p < .001$ ). Sharing on Facebook and sharing on Twitter did not differ ( $p > .96$ ).

*Total Recognition.* An analysis of variance revealed a significant interaction between identity-relevance and sharing partner on total recognition ( $F(2, 145) = 13.9$ ,  $p < .001$ ). For the identity relevant brand, respondents correctly recognized fewer statements pertaining to the product when it was shared with a best friend than the other two conditions ( $M_{\text{best\_friend}} = 7.19$ ,  $M_{\text{Facebook}} = 8.17$ ,  $M_{\text{Twitter}} = 9.58$ ;  $F(2, 145) = 3.79$ ,  $p < .03$ ). For the identity irrelevant brand news, consumers recognized significantly more statements correctly in the sharing with a best friend condition than the other two conditions ( $M_{\text{best\_friend}} = 10.3$ ,  $M_{\text{Facebook}} = 7.04$ ,  $M_{\text{Twitter}} = 6.28$ ;  $F(2, 145) = 11.9$ ,  $p < .001$ ).

*False Recognition.* There was a marginally significant interaction between the sharing partner and identity relevance on false recognition ( $F(2, 145) = 2.78$ ,  $p < .07$ ). For the identity relevant brand news, participants had more false recognition when sharing with a best friend than sharing on Facebook and sharing on Twitter ( $M_{\text{best\_friend}} = 2.59$ ,  $M_{\text{Facebook}} = 1.33$ ,  $M_{\text{Twitter}} = 1.71$ ;  $F(2, 145) = 3.45$ ,  $p < .04$ ). There were no significant differences when the brand news was identity irrelevant ( $p > .35$ ).

*Perceived Memory Safety.* An analysis of variance revealed a significant interaction between identity-relevance and sharing partner on perceived memory safety

( $F(2, 145) = 3.31, p < .04$ ). For the identity relevant brand, respondents perceived higher memory safety when it was shared with a best friend than the other two conditions ( $M_{\text{best\_friend}} = 4.33, M_{\text{Facebook}} = 3.57, M_{\text{Twitter}} = 3.28; F(2, 145) = 2.83, p < .07$ ), with no significant differences when the brand was identity irrelevant ( $M_{\text{best\_friend}} = 3.49, M_{\text{Facebook}} = 3.63, M_{\text{Twitter}} = 4.11; F(2, 145) = .99, p > .37$ ).

*Mediating Effect of Perceived Memory Safety.* To test whether perceived memory safety mediated the interaction of sharing partner and identity relevance on corrected recognition, 5,000 bootstrap resamples were performed using Hayes' (2014) SPSS macro for model 8. The model specified Y (i.e., the DV) as corrected recognition, X (i.e., the IV) as sharing partner, M (i.e., the mediator) as perceived memory safety, and W (i.e., the moderator) as identity relevance. The 95% confidence interval (bias-corrected) of the indirect pathway from sharing partner X identity relevance to the DV via the mediator excluded zero (.0300 to .5825; Effect= .2216; SE= .1389). I therefore conclude that perceived memory safety mediates the interaction of sharing partner and identity relevance on corrected recognition. Per my theorizing, I then tested the indirect pathway from sharing to memory via the mediator at each level of identity relevance. The 95% confidence interval (bias-corrected) for the conditional indirect effects excluded zero in the positive experience condition (.0161 to .4063; Effect= .1456; SE= .0969) but included zero in the control condition (-.2802 to .0237; Effect= -.0760; SE= .0743). I thus concluded that perceived memory safety mediated the effect of sharing partner on memory in identity relevant condition but not in the control condition.

*Brand Name Accessibility.* An analysis of covariance revealed a significant interaction between identity-relevance and sharing partner on time spent on brand recall

(attitude strength-brand name accessibility) ( $F(2, 145) = 3.63, p < .03$ ) when including the time spent on three practice questions (e.g. “How much do you like traveling?”) as covariates to control for individual differences in reading and typing speeds. When the American identity was primed, respondents took marginally more time to recall the brand name after sharing with a best friend as compared to the other two conditions ( $M_{\text{best\_friend}} = 20.6, M_{\text{Facebook}} = 9.04, M_{\text{Twitter}} = 10.8; F(2, 145) = 2.68, p < .08$ ). However, in the control conditions, respondents showed no significant differences in brand name accessibility ( $M_{\text{best\_friend}} = 7.22, M_{\text{Facebook}} = 12.9, M_{\text{Twitter}} = 16.0; F(2, 145) = 1.35, p > .26$ ).

*Attitude Confidence.* An analysis of variance revealed a significant interaction between identity-relevance and sharing partner on attitude confidence ( $F(2, 145) = 10.2, p < .001$ ). For the identity relevant brand, respondents reported lower confidence in their attitude towards the product after sharing with a best friend as compared to the other two conditions ( $M_{\text{best\_friend}} = 5.44, M_{\text{Facebook}} = 6.15, M_{\text{Twitter}} = 6.07; F(2, 145) = 4.18, p < .02$ ). For the identity irrelevant brand, consumers reported higher attitude confidence after sharing with a best friend than the other two conditions ( $M_{\text{best\_friend}} = 6.34, M_{\text{Facebook}} = 5.42, M_{\text{Twitter}} = 5.67; F(2, 145) = 6.17, p < .01$ ).

*Mediating Role of Corrected Recognition on Attitude Confidence.* To test whether corrected recognition mediated the interaction of sharing partner and identity relevance on attitude strength-confidence, 5,000 bootstrap resamples were performed using Hayes’ (2014) SPSS macro for model 8. The model specified Y (i.e., the DV) as attitude confidence, X (i.e., the IV) as sharing partner, M (i.e., the mediator) as corrected recognition, and W (i.e., the moderator) as identity relevance. The 95% confidence

interval (bias-corrected) of the indirect pathway from sharing partner X identity relevance to the DV via the mediator excluded zero (.0100 to .2414; Effect= .1071; SE= .0588). I therefore conclude that corrected recognition mediates the interaction of sharing partner and identity relevance on attitude confidence.

In the identity relevance condition, the 95% confidence interval (bias-corrected) for the conditional indirect effect of sharing partner on attitude confidence via the mediator excluded zero (.0041 to .1200; Effect= .0491; SE= .0284); In control condition, it also excluded zero (-.1488 to -.0064; Effect= -.0580; SE= .0349). I thus conclude that corrected recognition mediates the effect of sharing partner on in attitude confidence in both identity relevant and control conditions.

*Attitude/Purchase Likelihood.* Analyses on attitude favorability and purchase intentions revealed no significant interactions between sharing partner and identity relevance on attitude towards the product ( $p > .76$ ) or purchase likelihood ( $p > .9$ ), suggesting that forgetting-after-sharing effects may not directly affect consumer's overall attitudes but have a more subtle influence on attitude strength.

### 1.11.3 DISCUSSION

Study 5 extends my previous findings from the domain of sharing general consumption experiences to the sharing of more specific brand/product information and documents the consequence of forgetting-after-sharing on attitude favorability and strength. Intriguingly, I find that while attitude favorability is not significantly impacted by memory outsourcing, attitude strength is diminished when memory is attenuated post sharing. This is line with my prediction that memory outsourcing result in diminishing of verbatim but not gist memory.

This study also provides a better understanding of the underlying processes of memory outsourcing, by documenting that a desire to keep identity-relevant memories safe drives memory outsourcing. Thus, sharing a relevant experience with a close partner renders the memory safer (have been backed up on the memory cloud) and thereby presumably easier to forget. Intriguingly, although technological partners like social media sites ought to be objectively safer than humans since information posted on these sites is never deleted, I find that perceived memory safety for these partners is lower than human partners. Thus, the forgetting-after-sharing effect is attenuated for technological partners as compared to human partners.

#### 1.12 GENERAL DISCUSSION

Though marketing scholars and practitioners have long appreciated the value of understanding consumer memory, how social factors influence encoding and retrieval of consumer knowledge remains understudied (Alba, Hutchinson, and Lynch 1991; Cowley and Mitchell 2003; Nedungadi 1990). Taking this together with Dahl's (2013) call for more attention to social influences on consumer behavior, I explore the mechanism of memory outsourcing in a social sharing context. My research proposes a new framework that reconciles competing predictions about the memory effects of social sharing, and documents that sharing memories of consumption experiences can both enhance or decay such memories depending on the characteristics of the experience (e.g. identity-relevance, valence), the sharing partner (e.g. relationship closeness, memory ability) and their joint interaction.

Across five studies, I showcase a forgetting-after-sharing effect such that identity relevant memories are forgotten more than identity-irrelevant memories after being

shared with close partners as compared to distant partners. Study 1 found that for high identity-relevant experiences, sharing with acquaintances (close partners) enhances (reduces) memory, presumably through rehearsal (reliance on memory cloud). Additionally, I also found that the act of sharing activates memory outsourcing such that when sharing is eliminated, there is no memory outsourced or subsequent decay in memory. Study 2 documented that the memory decay after sharing was at retrieval and not at the time of encoding. Seeking to reveal the underlying mechanism of reliance on a safe memory cloud, study 3 limited the close partner's memory ability and found recovery of individual memory. Next, study 4 uncovered that positive (in comparison to negative) memories are more likely to be outsourced and forgotten, implying that the desire to protect and save is an important motive for memory outsourcing. Study 5 documented that non-human partners such as Facebook and Twitter are perceived as less dependable as compared to human partners thereby resulting in greater likelihood of outsourcing with humans than technologies. Study 5 also showed an intriguing result such that while outsourcing memories led to memory decay, it did not appear to impact attitudes towards the product, but lowered attitude confidence and accessibility. This suggests that consumer sharing of information can have deleterious effects on attitude strength.

#### 1.12.1 THEORETICAL CONTRIBUTION

My research findings contribute to the literatures on consumer memory, social sharing and TMS in several ways. The finding that sharing can lead to either memory enhancement or decay is a novel contribution since prior research has found only enhancement effects. Thus, despite increased rehearsal, consumers may forget brand,



product and experience information, which may not be advantageous to marketers. My findings also extend prior work on memory outsourcing by documenting retrieval based outsourcing as compared to encoding based transactions. Thus, I find that social sharing of equivalently encoded information can result in retrieval based outsourcing and subsequent forgetting. This finding provides greater insight into the processes underlying memory outsourcing and suggests that memory outsourcing may be more pervasive than previously conceptualized. I also add to this stream of research by documenting additional moderators to the memory outsourcing effect, namely identity relevance, and experience valence, both of which have not been previously considered in the TMS literature. Finally, my findings with respect to the effects of memory outsourcing on attitudes and attitude strength further extend the literature through the identification of these downstream consequences.

From a sharing perspective, research on the social sharing of emotions has shown that people like to share their negative emotions since the intensity of such negative emotions is reduced by the act of sharing (Rimé et al. 1992). However, it remains unclear whether they still remember the negative experience after sharing. My findings suggest that companies should pay more attention to negative word of mouth because further sharing might reinforce consumer's memory, and emphasizes the importance of word of mouth – both personal as well as online – for marketers.

#### 1.12.2 LIMITATIONS AND FUTURE RESEARCH

While I document the forgetting-after-sharing effect along with some moderators, my research focuses on relatively common, every day and frequent consumption experiences (shopping, product news). It would be important and interesting to consider

experiences that may be infrequent and highly memorable or important to see if outsourcing would still hold. For example, memories of weddings, graduations, birthday celebrations may be so important to consumers' identities that they will not decay despite sharing, suggesting that there may be distinctions in the effects of memory outsourcing even *within* identity-relevant experiences.

While I control for the sharing experience as well as the manner in which details of the experience are shared (factual recall, amount of recall etc.), it would be interesting to consider whether and how factors such as goal to engage in sharing – e.g. impression management (Berger 2014) and type of language – e.g. explaining versus non-explaining (Moore 2012) – may impact our effects.

My research focuses on the effects of sharing on the sharer, but ignores the potential effects and consequences for the sharing partner. Future research could examine the effects of listening to other consumer experiences on the memories and attitudes of the listener. Prior work has shown that exposure to vivid information can lead to false consumption experience memories (Rajagopal and Montgomery 2011), and it would be interesting to examine if simply listening to other consumption experiences can lead to such memory distortions.

The prevalent use of the Internet and other technologies call for more research on how these new technologies substitute for traditional human partners in memory outsourcing. My research reveals potential differences between human partners and using technology such as social media (Facebook) as external memory aids, with humans eliciting greater memory decay than technology. These findings may be related to recent work (Dietvorst, Simmons, and Massey 2015) which has found that people are inclined to trust

humans more than machines. In their study, even when a computer algorithm clearly outperformed a human forecaster, respondents still chose the inferior human forecaster over the algorithm due to the assumption that machines would keep making the same mistake repeatedly, while humans would learn from their errors and improve their performance. These findings suggest that people might trust nonhuman and human partners differentially, and view non-human partners as less secure repositories than humans.

## ESSAY 1 FIGURES

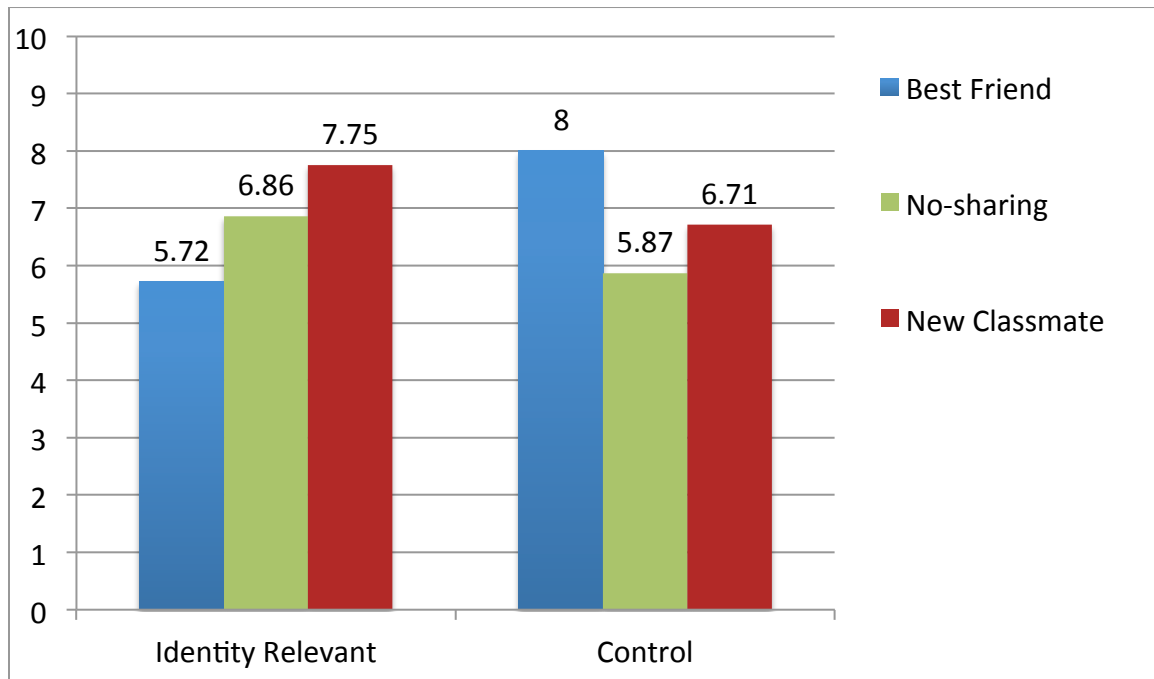


Figure 1.1: Study 1 Corrected Recognition by Sharing Partner and Identity Relevance

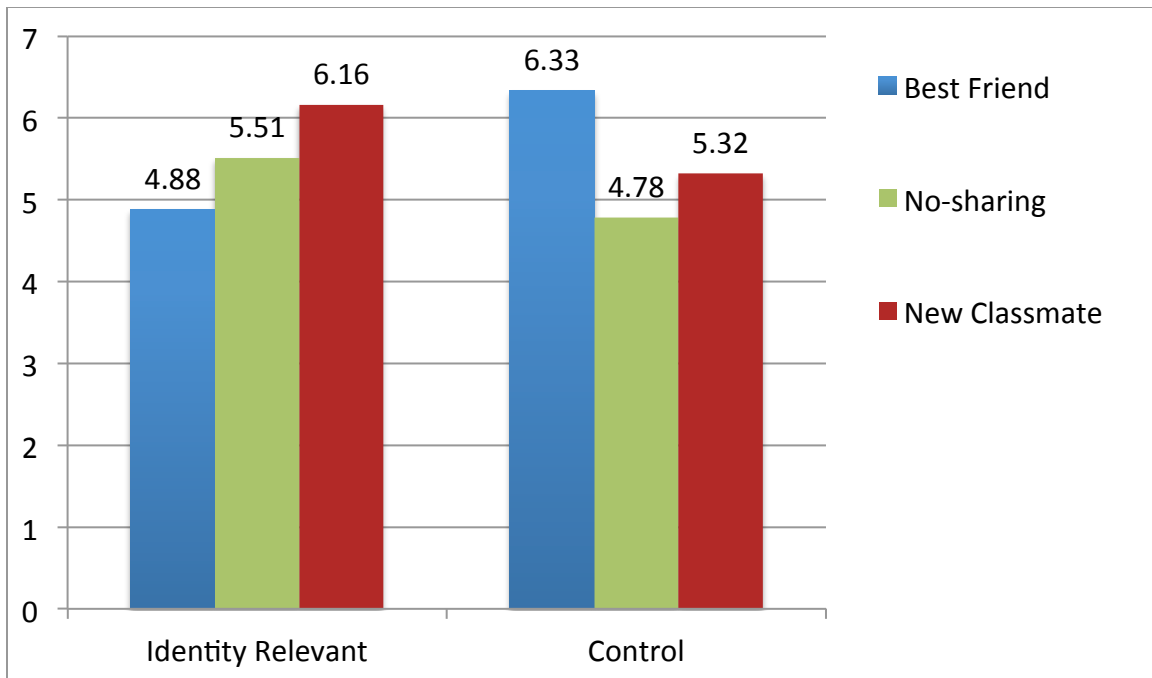


Figure 1.2: Study 1 Cued Recall by Sharing Partner and Identity Relevance

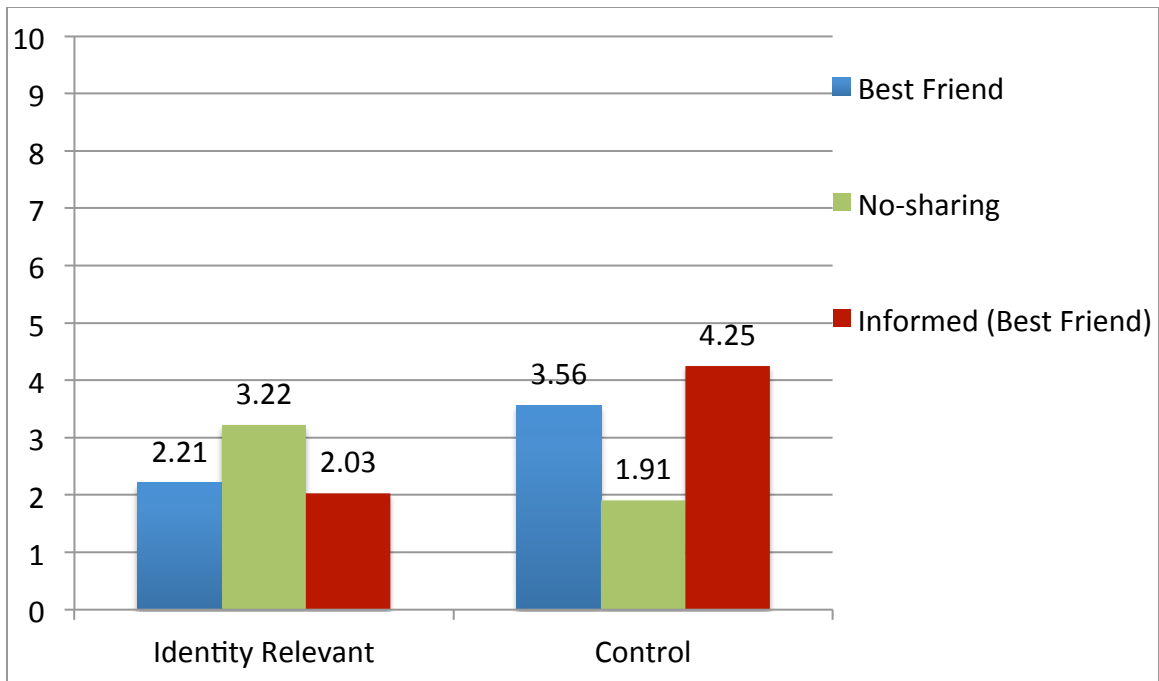


Figure 1.3: Study 2 Corrected Free Recall by Sharing Partner and Identity Relevance

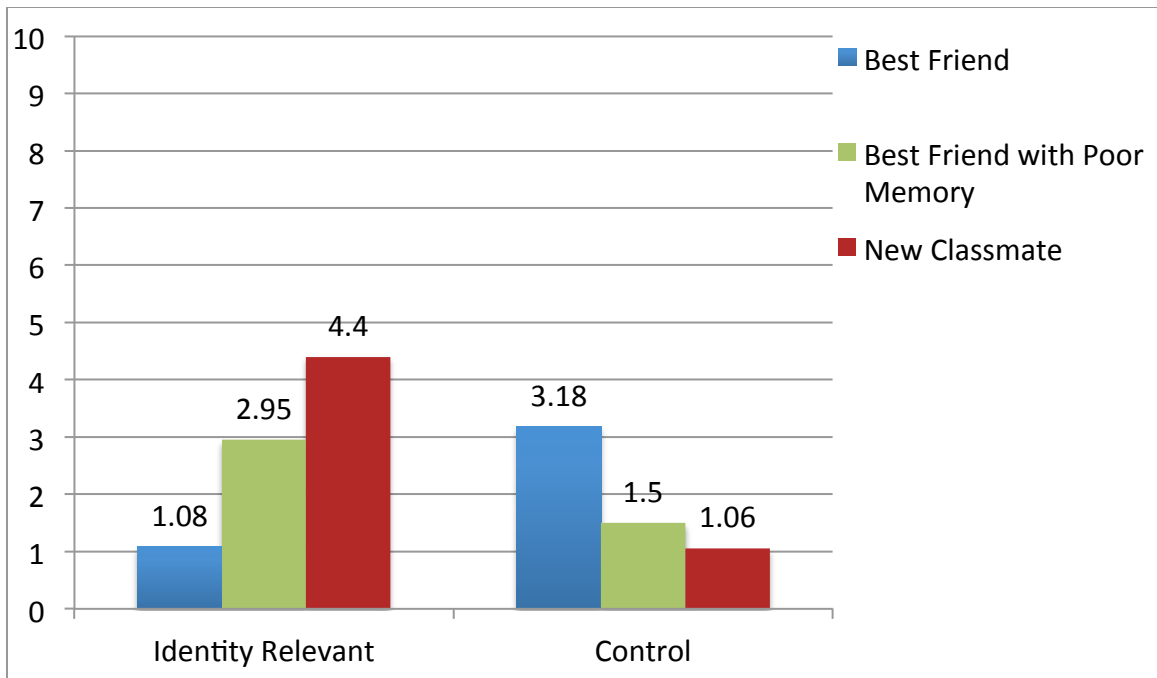


Figure 1.4: Study 3 Corrected Free Recall by Sharing Partner and Identity Relevance

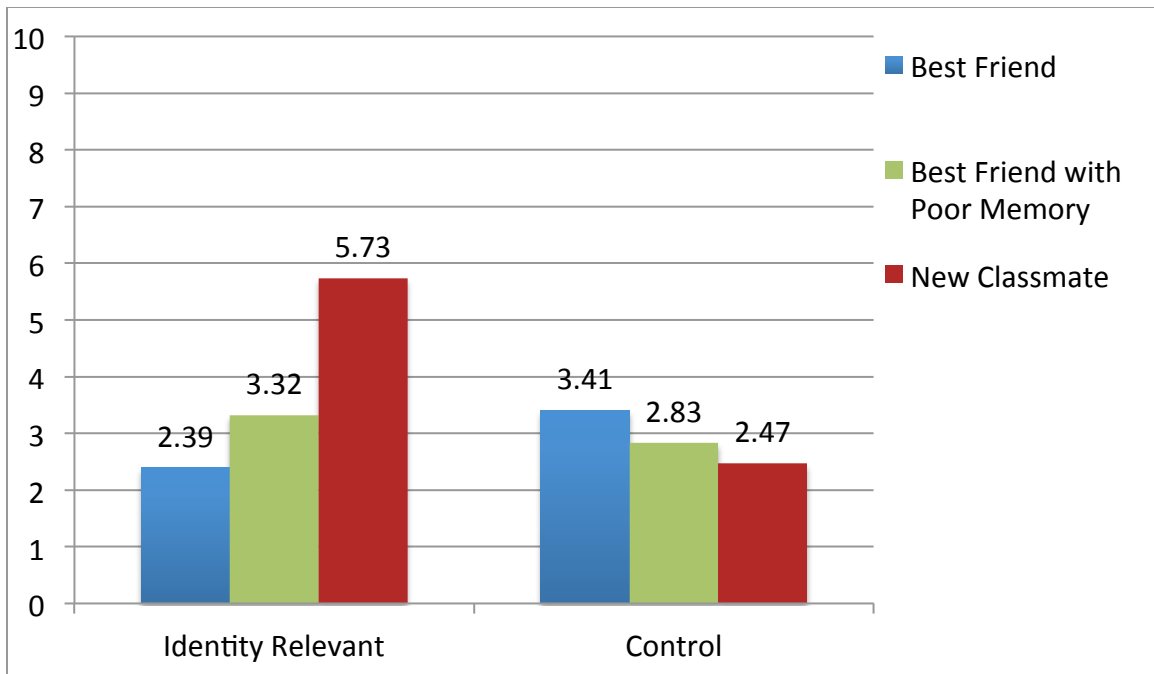


Figure 1.5: Study 3 Corrected Recognition by Sharing Partner and Identity Relevance



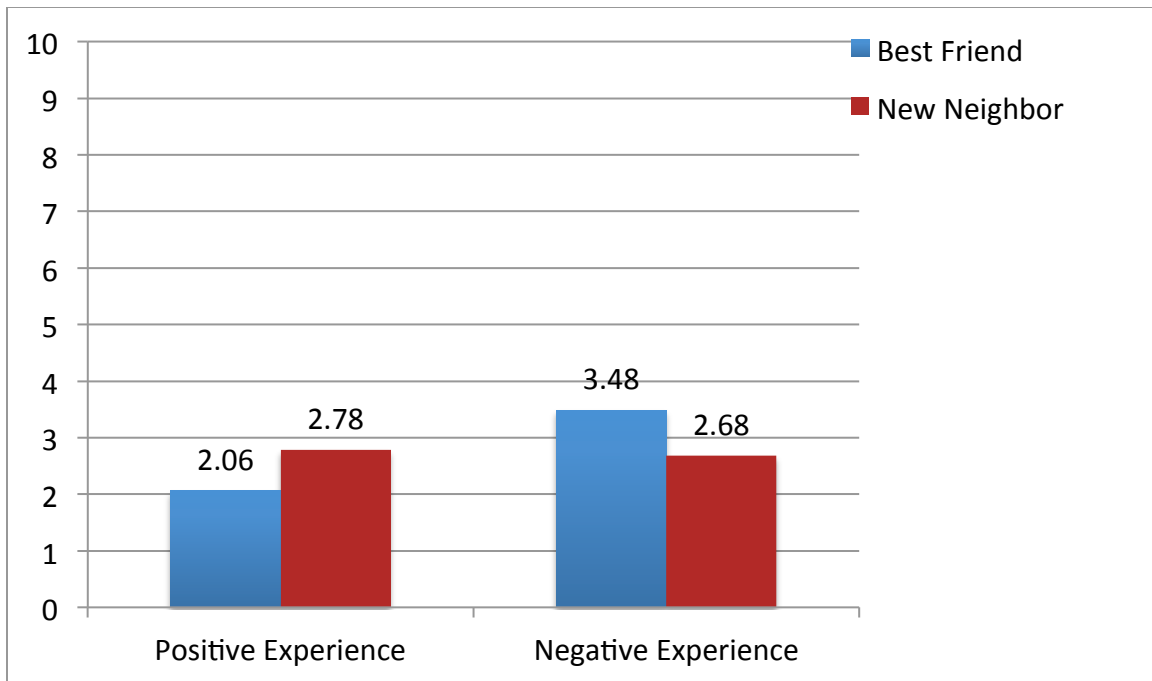


Figure 1.6: Study 4 Corrected Free Recall by Sharing Partner and Identity Relevance

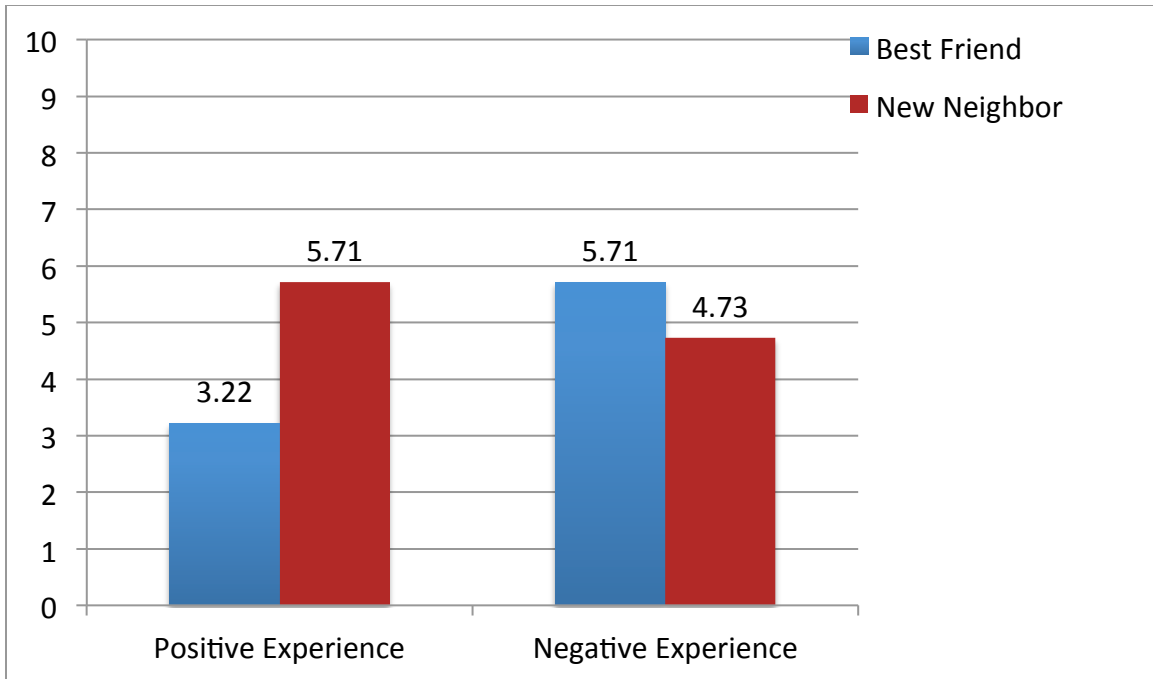


Figure 1.7: Study 4 Corrected Recognition by Sharing Partner and Identity Relevance

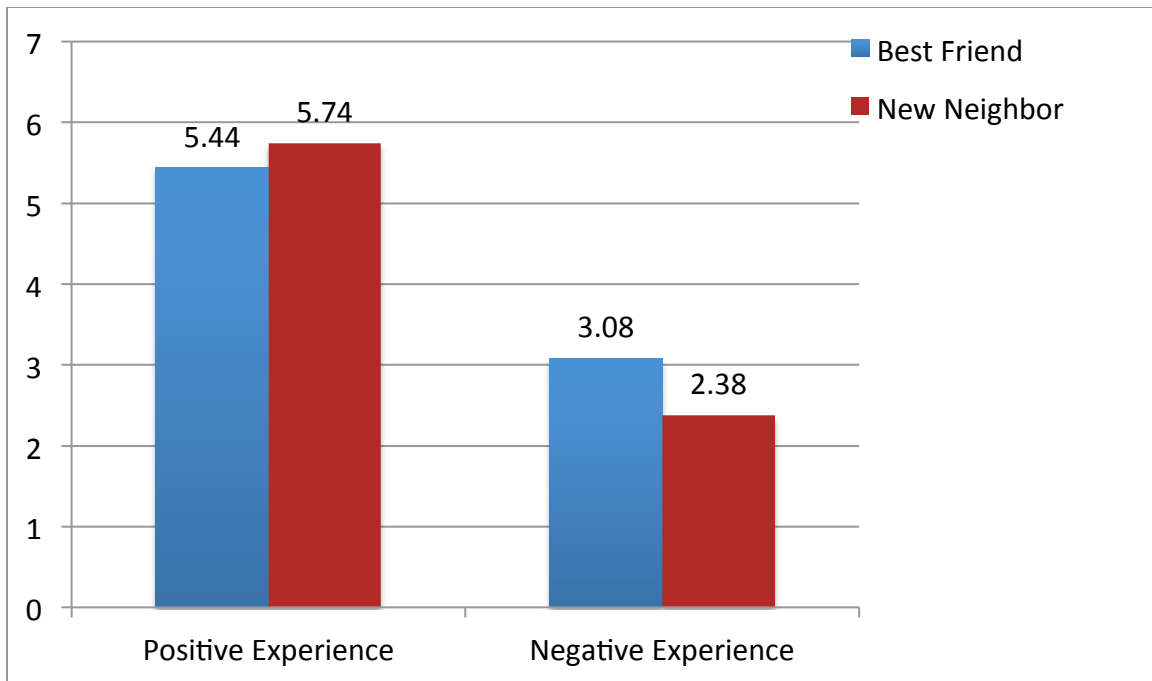


Figure 1.8: Study 4 Perceived Enjoyment by Sharing Partner and Identity Relevance

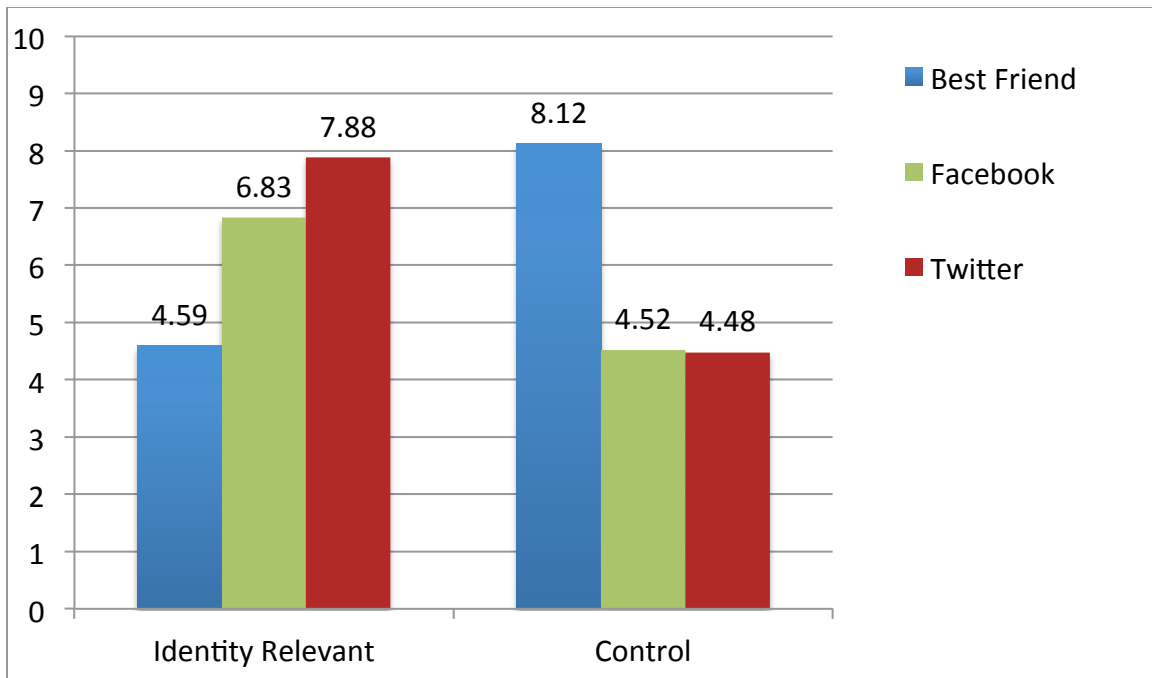


Figure 1.9: Study 5 Corrected Recognition by Sharing Partner and Identity Relevance

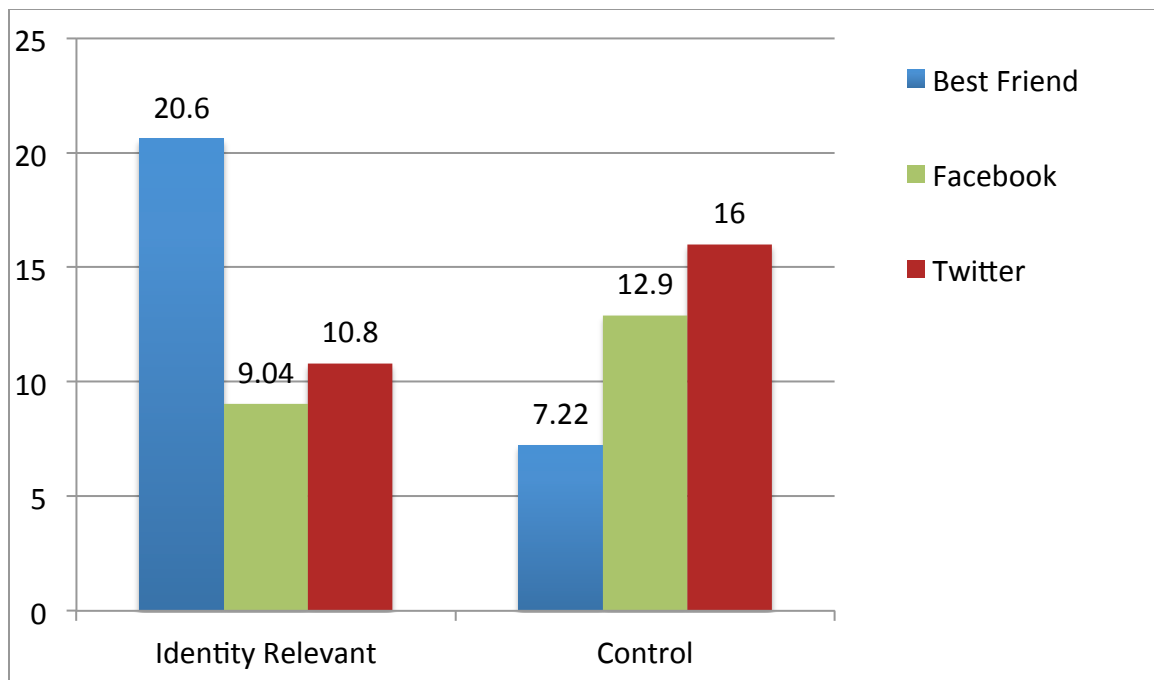


Figure 1.10: Study 5 Brand Accessibility by Sharing Partner and Identity Relevance

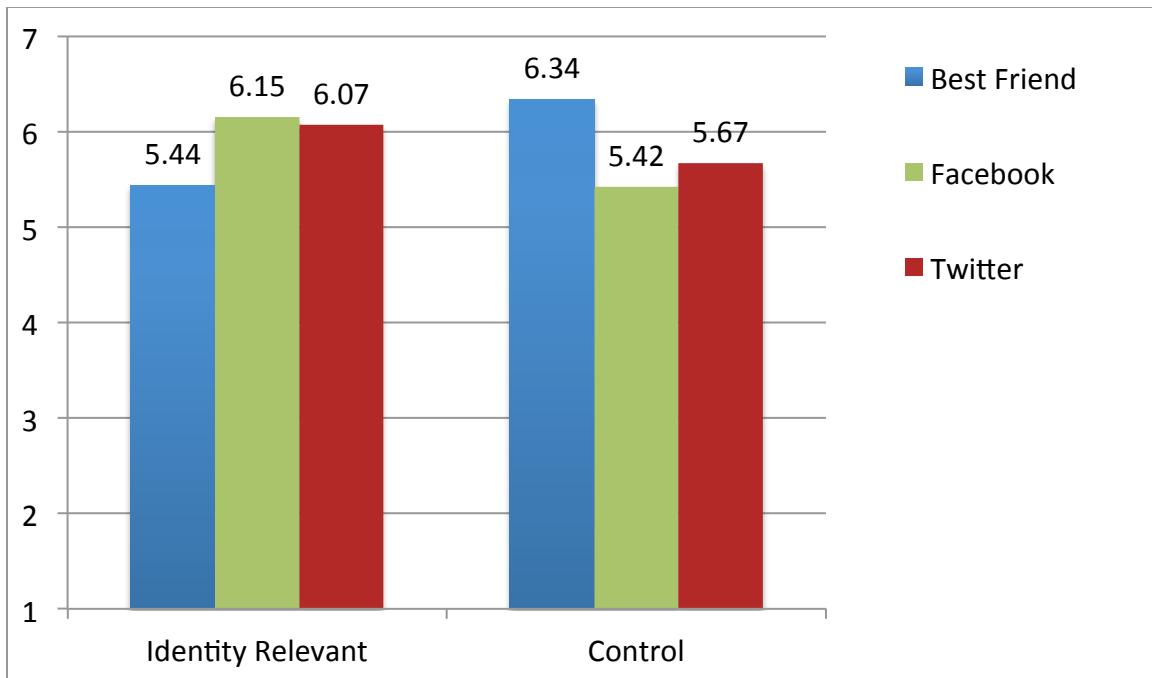


Figure 1.11: Study 5 Attitude Confidence by Sharing Partner and Identity Relevance

ESSAY 2: IS TECHNOLOGY A DANGEROUS DEPENDENCY? THE  
ROLE OF ANTHROPOMORPHISM IN DIGITAL SHARING

## 2.1 ABSTRACT

As people adapt to sharing memories with technologies (e.g. Twitter, Facebook, blogs and review sites), researchers are unclear how sharing with such nonhuman partners impacts our memories for the shared experiences. I examine how characteristics of technological partners (e.g. anthropomorphism) can impact the way people remember/forget their meaningful memories. Four studies show that sharing identity relevant (vs. neutral) memories on an anthropomorphized technological platform (vs. no sharing) may induce memory decay because of outsourcing the memories to this humanized partner. This effect was reversed when the technology is objectified or is playing a servant role. Altering the accessibility of anthropomorphized partner hinders memory outsourcing and undermines memory decay.

## 2.2 INTRODUCTION

It is indeed an era of digital sharing (Belk 2013). People update their Facebook account as soon as they wake up, share the news on Twitter when going to work, post pictures on Instagram of their lunch and upload videos of their dinner on YouTube. Consumers have experienced an explosion of technology-mediated sharing (Protalinski, 2011), with 40% of online conversations comprising the sharing of identity-relevant experiences that help reinforce consumer identities (e.g. watching a University football game - Tamir and Mitchell, 2012). Besides face-to-face verbal sharing, people share their experiences via technological outlets such as E-mail, texting, cellphones, social media and other online repositories (e.g. Google Drive, iCloud, Dropbox - (Carlson and Shontell 2013). These technology advancements have dramatically changed the way we consume, present ourselves, and communicate (Belk 2013). Despite this proliferation in sharing via



technology, research on the effects of technology on human perceptions and reactions is sparse (Shen, Zhang, and Krishna, 2016).

Companies are searching for the best strategies to take advantages of the massive growth of online consumer sharing. Traditional retailers see opportunities to enhance sales by leveraging consumer reviews and comments (e.g. Amazon.com) and many online social networking sites rely entirely on users' sharing content to maintain users (e.g. Yelp) and match their targeted-advertising system to earn profits (Hutchinson 2016). It is not surprising therefore that firms are investing greater resources to attract users to share personal experiences on their websites (Griffith 2016). Marketing academics has found that building a more personal relationship with online users by anthropomorphism (e.g. Hudson et al. 2016) can enhance brand relationships with consumers. Common tactics including providing personalized greetings at login (e.g. "Good morning, Jack, welcome back!") and using humanized tones for communicating messages- "How can I help you today?" "Thank you for sharing your experiences with me" can enhance liking of products (Aggarwal and McGill 2007), render consumers to monitor their actions to be in consistent with the ways suggested by the brand (Aggarwal and McGill 2012), and fulfilling belongingness needs (Mourey, Olson, and Yoon 2017). However, little is understood about how the anthropomorphism of technology may impact how consumer encode and retrieve the information they share on these technological platforms and researchers have called for greater focus on the perceptions of online communication partners and how they affect people's information processing (Sparrow and Chatman 2013). My research addresses these gaps and explores how consumer perceptions of technological sharing platforms can change memories for the shared information.

Specifically, how are consumer memories about consumption episodes affected when these experiences are shared with technologies? Building on findings from Essay 1, I examine under what situations technologies can facilitate versus hinder memory outsourcing after social sharing.

As outlined in essay 1, a memory cloud is more likely to be developed when the sharing human partner is perceived to be trustworthy, safe, and accessible. People automatically backup important memories they want to save to this memory cloud and subsequently forget the details of the memories outsourced, but remember the location of the cloud. In this essay, I examine when and how nonhuman technologies function as a memory cloud resource.

Previous research shows that technologies which can guide users to the location of sought after expertise (e.g. online directories) enhances users' understanding of information structure (Yuan et al. 2007) and facilitates the operation of a TMS. Moreover, technology systems can act as external memory repositories and alter information encoding. For example, Sparrow, Liu and Wegner (2011) find that people encode less information when they rely on Google resulting in better memory for the source of the information rather than the content of the information searched. Henkel (2014) documents similar evidence with respect to reliance on digital cameras to record objects or events, thereby leading to poorer memories of the objects/events as compared to simply observing the objects without taking pictures.

In the domain of consumer behavior and marketing, researchers have found that people can form quasi-interpersonal relationships with nonhuman entities such as brands and products (Aaker, 1997; Aggarwal and McGill 2012). Recent work in this area reveals

that consumers can interact with technology systems such as retail web sites (Wang et al. 2007), cell phones (Hudson et al. 2016), tablet computers (Wang and Nelson 2014) in ways similar to interpersonal interactions. Therefore, these technologies ought to be able to function similar to human partners in a social sharing context.

However, other research has found that technologies can attenuate cognitive efficiency and functioning. Thus, compared to dyads communicating face-to-face, those who communicate via email and the telephone have no effects on awareness of expertise location, resulting in poorer TMS functioning (Lewis 2004; He et al. 2007). These inconsistent results in prior research suggest that there could be potential moderators to the effect of technology to serve as memory clouds. I suggest that one such moderator may be the characteristics of the technology, i.e. its perceptions as a pure knowledge storage tool versus an interactive agent. While technologies may do well in static memory storage, and therefore impair the sharer's memories in some situations, they may be deficient at initiating dynamic memory outsourcing akin to human partners in a social situation. In other words, the level of interaction and feedback obtained during sharing from human partners is likely to be much higher than from pure technology partners and results in higher partner quality in humans than nonhumans. I therefore suggest that technologies possessing human-like attributes are likely to elicit effects similar to sharing with human partners.

Thus, I extend the literature by suggesting that the type of information shared (e.g. identity-relevant) interacts with characteristics of the technology (anthropomorphism, servant/partner role) to impact memory. Specifically, I predict that when identity-relevant (identity-irrelevant) information is shared using technologies that are closer to human

(technological) partners – i.e. anthropomorphized (objectified), memory for the shared information is likely to be worse (better). I suggest that these effects are due to differences in perceptions of the technologies as sharing partners, with anthropomorphized technologies perceived as being human and hence functioning as safe, trustworthy repositories for the memories.

My research will contribute to the literatures in social sharing, consumer memory, and anthropomorphism in several ways. First, while a few prior studies (e.g. Sparrow et al. 2011) have investigated the effects of technologies on information encoding, they only consider technology as a storage tool and fail to capture its interacting role in social contexts. This study documents a novel effect that sharing with technologies can be detrimental to consumer memories. Second, I uncover how consumers save/preserve meaningful memories by outsourcing them to the human-technology memory cloud and point out the key prerequisites for memory outsourcing to the technology partner- perceived partner quality should be high enough to let the sharer believe the technological partner is able to understand the “social interaction”. Thus, anthropomorphism of technology platforms may facilitate consumer-technology sharing on one hand, but impairs the sharer’s memories on the other hand. This is the first paper that looks at anthropomorphism effects on consumer memory. Third, I identify two moderators that impact perceptions of technological sharing partners – anthropomorphizing roles and the accessibility of the technological partner - and document their critical roles in impacting consumer memories and subsequent judgments. These new findings contribute to the scant literature on how situational factors influence memory outsourcing. Finally, my findings will contribute on enhancing our

understanding of how WOM spread via technologies such as the Internet and social media may impact consumer memories.

The rest of Essay 2 is organized as follows: I begin by summarizing relevant literature in social sharing and the perceptions of technology and develop my conceptual framework. I then present the results of four empirical studies that provide support for the effect of anthropomorphized technology on consumer memory. I then conclude with a discussion of my contributions and future research opportunities.

## 2.3 SOCIAL SHARING AND TECHNOLOGY

Technology has directly and indirectly altered the way we share and remember information (Ward 2013). Because of digital storage (e.g. Mp3, megapixel camera, flash drive, portable hard-disk, the “Cloud” storage) and other Internet supported outlets (Email, smartphone, social media), consumers have witnessed a dramatic growth of technology-mediated sharing (Protalinski 2011). However, research on the effects of technology artifacts on human perceptions has only begun recently (Hao, Zhang and Krishna 2016). The cognitive impact of using technologies in social sharing thus remain opens to further exploration (Sparrow and Chatman 2013).

Communication with humans versus digital agents can elicit different perceptions of the interacting partner. While the experience of conversing with others is pleasant and rewarding (Wagner et al., 2015), at least partly due to the feedback and interactions that are an inherent component of such sharing experiences, sharing with technologies may not be as affective as interacting with humans because they are devoid of socialness, and cannot generate a feeling of listening and understanding. Further, since technological artifacts are relatively new innovations and designed to outperform human abilities in

some aspects to enhance task performances (Hartson and Gray 1992), they can often appear to be sophisticated, challenging, and daunting (Fitzgerald, et al. 2013). Prior literature has showed that consumers even exhibit resistance to technologies because of a feeling of powerlessness (Lee and Allaway, 2002; Dietvorst, Simmons and Massey, 2015). Overall, therefore technology often seems competent but not warm. Hence, people may perceive human partners as being more responsive, supportive, and caring (higher quality) than technologies during social sharing.

While people can form close relationships with both human and nonhuman objects (Aaker, 1997), such relationships vary in strength with perceived partner quality underlying relationship strength and shaping people's expectations and behaviors in social interactions. A responsive, trustworthy, dependable, supportive partner is expected to behave in such a manner that he/she is proactively caring what you care about and is taking the initiatives to serve your long-term interests (Aaker, Fournier, and Brasel 2004). Generally, you can expect he/she to sense what you need and what you want (even without explicit requests) and he/she is the person you can always count on. As a result, the higher the perceived partner quality, the higher the dependency and the higher the likelihood of expecting partners to share responsibilities (Lee and Kim 1999).

Recent work by Dietvorst, Simmons, and Massey (2015) finds that people are inclined to trust humans more than machines. In their study, even when a computer algorithm clearly outperforms a human forecaster, respondents still choose the inferior human forecaster over the algorithm, because people tend to more easily lose confidence in the algorithm as compared to the human forecaster after an error. The reason for this preference is due to the assumption that machines would keep making the same mistake

repeatedly, while humans would learn from their errors and improve their performance. These findings suggest that people view human and technology differentially in the social relationships, with human more trustworthy than technology.

Collectively these findings suggest that because a memory cloud is likely to develop when the sharing partner is perceived to be trustworthy, safe, and accessible, it will be easier for people to develop a memory cloud with a human than a nonhuman. As a result, memory outsourcing is more likely to a close human partner than the technological partner. Consequently, consumers' transferring the details of memories to the sharing partner obviates the need to remember those details themselves and lead to memory decay.

## 2.4 ANTHROPOMORPHISM AND PERCEIVED PARTNER QUALITY

Humans have a general tendency to attribute human characteristics to non-human objects for an inherent need to belong (Epley, Waytz, and Cacioppo 2007). Research in marketing has focused on how consumers can develop an interpersonal relationship with products and brands and shown that anthropomorphism can increase connectedness, increase likability of the non-human objects (e.g. Aggarwal and McGill 2007; Landwehr, McGill, and Herrmann 2011), and is a necessity for consumer-brand relationship to form (Fournier 1998). Likewise, technology empowered with social cues may form a quasi-interpersonal relationship with consumers. Thus, a retail website which uses language, voice, interactivity and social roles is perceived more social, and has a positive effect on user-computer interaction (Wang et al. 2007). A slot machine becomes less risky to people with high power when it is anthropomorphized (Kim and McGill 2011), highly frequent social media interaction with an anthropomorphized laptop brand is desirable to

consumers under high uncertainty avoidance (Hudson et al. 2016), and a touchscreen tablet generates more “mental product interaction” than a laptop using mouse and encourages affective choices (Shen et al. 2016). Taken together, these findings suggest that once a technology artifact is anthropomorphized (with human attributes, intentions and behaviors), consumers may think about it according to familiar social roles, norms and expectations and perceive the overall human-technology interaction as being more resemble to human-human interaction. As a result, an anthropomorphized entity is expected to have its own mind (capable of thinking and feeling) and act as an intentional agent (to take good care of close partners) - being more responsive and supportive. Recent evidence also shows that anthropomorphism can increase trust in technology (Waytz, Heafner, and Epley 2014). Attributing a humanlike mind to a nonhuman agent, people believe that the autonomous vehicle should be more mindful and have the greater ability to sense and adapt to its surroundings than mindless machinery. Therefore, an anthropomorphized technology should elicit higher trust and perceived partner quality perceptions than non-anthropomorphized (objectified) technology.

## 2.5 PERCEIVED PARTNER QUALITY AND MEMORY OUTSOURCING

Memory clouds develop with the objective of enhancing efficiency and group performance, and rely on reliable, dependable and well-coordinated partners (Lewis and Herndon 2011). While not directly investigating memory outsourcing, some research has suggested that the perception of the technology affects human-technology interaction. For example, compared to face-to-face communication, communication via technological means such as email and telephone conversation has no effect on TMS emergence (Lewis 2004; He et al. 2007). Hollingshead (1998b) finds that face-to-face communication can



facilitate transactive retrieval when the dyads can use nonverbal and paralinguistic cues to signal and combine their knowledge effectively. Compared with members of face-to-face dyads, members of dyads using a computer were less likely to assist each other in memory tasks. Alavi and Tiwana (2002) demonstrated that technology-mediated interactions are likely to constrain the maintenance of transactive memory in virtual settings. Similarly, Cordery and Soo (2008) mention that virtual teams are less effective in knowledge development and information sharing. These results imply that human face-to-face communication may elicit greater perceived control than technology-mediated communication and thus foster more effective TMS functioning.

These findings suggest that increasing perceived partner quality of the technology may facilitate memory outsourcing in sharing. In this regard, anthropomorphized technology devices will be attributed with more human personality traits, intentions and behaviors than objectified technology devices. The more the technology seems to have humanlike mental capacities, the more people should trust it to perform its intended function competently (Waytz, Heafner and Epley, 2014). If people perceive a technology device has its own “mind”, people will trust it more and expect it can behave like a human partner in predictable social manners (e.g. remembering what friends told you). This perceived partner quality will encourage the outsourcing of memories to the technological partners and induce memory decay.

As reviewed in Essay 1, people have higher motivation to backup identity relevant memories to close (as compared to distant) others. Anthropomorphized (objectified) technology should be parallel to close (distant) sharing partners in social sharing setting. Therefore, I predict that, when sharing identity relevant (irrelevant)

experience, people will forget (remember) more details of the experience when the sharing partner is an anthropomorphized technology as compared to an objectified technology.

## 2.6 STUDY 1

Study 1 explores the differences between sharing with human and nonhuman partners. I predict that a technological platform may not function similarly to a close human partner because of the differences in perceived partner quality. Hence, memory decay for identity relevant experience is more likely when sharing with a close human partner as compared to a technological partner or no-sharing (control). When the experience is identity neutral, sharing with human and non-human partners should remember more information than no-sharing because of the rehearsing effect of sharing. Since Facebook is the most popular technological platform on which people share a lot of personal experiences, people also form close relationships with Facebook because they frequently use it (Town 2016). Therefore, I select Facebook as the stimulus.

### 2.6.1 PRETEST OF NATIONALITY IDENTITY

To prime nationality among American respondents, I incorporated an American identity prime in a travel experience. Forty-five American Mturk participants were randomly assigned to two conditions (identity relevance high vs. low). In the identity relevance high condition, participants were asked to imagine joining a special tour group called “Mini-United Nations” which included only one representative from a country to visit cities with unique cultural blends and were informed that they were the American representative in one of these tour groups heading to Hong Kong, a city famous for its unique fusion of East and West. In the identity relevance low condition, participants read

a similar scenario and imagined themselves as party of a tour group heading to Hong Kong. Subsequently, all participants were exposed to a travel scenario recording a one-day detailed travel schedule (e.g. when, where and what they did). As part of the travel experience scenario, participants received a visitor guidebook containing 15% discount coupons for 12 different target brands (6 American brands and 6 international brands; e.g. American Airline, Ralph Lauren, Levi's, Samsung, Ikea, Sony) and 12 filler brands. I measured identity relevance of the overall travel experience, and the familiarity, liking, perceived expensiveness, and perceived American identity of the 24 brands.

Analyses of variance revealed the expected significant difference between identity prime and control conditions on overall identity relevance ( $M_{\text{identity}} = 4.27$  vs.  $M_{\text{control}} = 3.53$ ;  $F(1, 44) = 4.16, p < .05$ ) as well as on the perceived identity relevance of the two sets of target brands ( $M_{\text{american}} = 5.98$  vs.  $M_{\text{international}} = 3.46$ ;  $F(1, 44) = 12.8, p < .001$ ). There were no differences on perceived familiarity, liking and perceived expensiveness of the two sets of brands, confirming successful manipulation of identity relevance.

## 2.6.2 PARTICIPANTS, DESIGN AND PROCEDURE

Two hundreds and ninety-three American MTurkers participated in a 2 (experience identity relevance: high vs. low) x 3 (sharing partner: close friend, Facebook, no-sharing) between subjects study for monetary compensation (55 cents). An American identity was made salient (vs. not) in a travel experience to Hong Kong. All participants were exposed to this travel scenario recording a one-day detailed travel schedule (e.g. when, where and what they did) with photos of tourism spots. During travel, participants received a visitor guidebook containing coupons for 12 brands (6 American and 6 international brands). After the scenario, participants were provided photos about their

experience again (to assist the complete sharing) and shared their experience with their best friend or on Facebook or writing a description of a movie they watched recently (control). After the filler tasks, I measured their recognition memory for the travel experience and identity-linked brand promotions. The experience recognition measure required respondents to select details about the travel experience from a set of 24 statements, of which 12 were true and 12 were false. Corrected recognition was computed by subtracting false recognition from true recognition (adapted from Dalton and Huang 2014). The corrected hits of identity-linked promotion were computed by correctly identifying old as old – falsely identifying new as old. Then they were debriefed after the demographic questions.

### 2.6.3 RESULTS

*Corrected Recognition of the travel experience.* An analysis of variance revealed a main effect of sharing partner ( $F(1, 287) = 4.24, p < .02$ ) and a significant interaction between the sharing partner and identity relevance on the corrected recognition of the travel experience ( $F(2, 287) = 15.6, p < .001$ ). When the experience was low in identity relevance, participants remembered more details when sharing with the best friend as compared to sharing on Facebook ( $p < .10$ ) or no-sharing ( $p < .01$ ) ( $M_{\text{bestfriend}} = 6.83$ ,  $M_{\text{Facebook}} = 5.85$ ,  $M_{\text{no-sharing}} = 4.87$ ;  $F(2, 287) = 5.99, p < .01$ ). When the travel experience was highly identity relevant, participants forgot more details of the experience after sharing it with the best friend as compared to sharing on Facebook ( $p < .001$ ) or no-sharing ( $p < .01$ ) ( $M_{\text{bestfriend}} = 4.18$ ,  $M_{\text{Facebook}} = 7.15$ ,  $M_{\text{no-sharing}} = 6.08$ ;  $F(2, 287) = 14.5, p < .001$ ). Interestingly, after sharing identity relevant travel experience on Facebook, participants' memories were enhanced rather than decay as compared to no-sharing ( $p <$

.06). These results suggested that people treated human and nonhuman partners differently even though they may form similar close relationship with them.

*Total Recognition of Travel Experience.* An analysis of variance revealed a significant main effect of sharing partner ( $F(1, 287) = 8.48, p < .001$ ) and a significant interaction between sharing partner and identity-relevance on total recognition ( $F(2, 287) = 14.5, p < .001$ ). The simple contrasts followed the expected patterns. For the identity irrelevant travel experience, respondents correctly identified more of the travel information when it was shared with best friend as compared to sharing on Facebook ( $p < .06$ ) or no sharing ( $p < .001$ ) ( $M_{\text{bestfriend}} = 8.80, M_{\text{Facebook}} = 7.98, M_{\text{nosharing}} = 6.94$ ;  $F(2, 287) = 9.92, p < .001$ ). For the identity relevant travel experience, respondents correctly identified less of the travel information when it was shared with the best friend than on Facebook ( $p < .001$ ) or no sharing ( $p < .09$ ) ( $M_{\text{bestfriend}} = 7.12, M_{\text{Facebook}} = 9.25, M_{\text{nosharing}} = 7.85$ ;  $F(2, 287) = 13.8, p < .001$ ).

*False Recognition of Travel Experience.* There was a significant main effect of sharing partner ( $F(1, 287) = 3.00, p < .06$ ) and an interaction between the sharing partner and identity relevance on false recognition ( $F(2, 287) = 4.80, p < .01$ ). For the identity relevant travel experience, participants had more false recognition when sharing with the best friend than sharing on Facebook and no sharing ( $M_{\text{bestfriend}} = 2.94, M_{\text{Facebook}} = 2.23, M_{\text{nosharing}} = 1.77$ ;  $F(2, 287) = 7.55, p < .01$ ). . There were no significant differences when the travel experience was identity irrelevant ( $M_{\text{bestfriend}} = 1.98, M_{\text{Facebook}} = 2.12, M_{\text{nosharing}} = 2.08$ ;  $F(2, 287) = .29, p > .75$ ).

*Corrected Hits of Identity-Liked Promotions.* Twenty-four brand coupons (6 old + 6 new American brand coupons and 6 old + 6 new International brand coupons) were

randomly displayed one per page and participants identified all the coupons that they recalled seeing in the travel experience (visitor guidebook). Corrected Hits of Identity-liked Promotion was computed by subtracting the numbers of new American brand identification from the numbers of old American brand identifications. There was a significant main effect of sharing partner ( $F(1, 287) = 3.27, p < .05$ ) and an interaction between the sharing partner and identity relevance on corrected hits of identity-liked promotions ( $F(2, 287) = 16.2, p < .001$ ). The simple main effect of sharing was significant when the brand promotions were identity irrelevant ( $M_{\text{best\_friend}} = 4.48, M_{\text{Facebook}} = 3.78, M_{\text{nosharing}} = 3.25; F(2, 287) = 8.03, p < .001$ ). When the brand promotions are identity irrelevant, participants correctly identified more brand coupons after sharing with best friend as compared to sharing on Facebook ( $p < .03$ ) or no-sharing ( $p < .001$ ); The simple main effect of sharing was significant when the brand promotions were identity relevant ( $M_{\text{best\_friend}} = 3.31, M_{\text{Facebook}} = 4.78, M_{\text{nosharing}} = 4.23; F(2, 287) = 12.0, p < .001$ ). Participants identified less correct brand coupons in best friend condition as compared to Facebook ( $p < .001$ ) or no-sharing condition ( $p < .01$ ).

Further, consumers' recognition memory for identity-linked promotions was higher in the "sharing on Facebook" condition than in the other two conditions (best friend ( $p < .001$ ) and no sharing ( $p < .08$ )).

I conducted similar analyses with corrected hits of identity irrelevant (international) brands (old international brands – new international brands) but found no significant effect between sharing partner and identity relevance ( $p > .1$ ), suggesting that the memory effects I found were highly selective and implying identity-based motivated memory biases.

*Total Identification of Identity-Liked Promotions (Old American brands).* An analysis of variance revealed a significant main effect of sharing partner ( $F(1, 287) = 5.40, p < .01$ ) and an interaction between sharing partner and identity relevance on the total correct identification of identity-liked promotions (total old American brands ( $F(2, 287) = 11.3, p < .001$ )). The simple main effect of sharing partner was significant in the identity irrelevant condition ( $M_{\text{best\_friend}} = 5.09, M_{\text{Facebook}} = 5.33, M_{\text{nosharing}} = 3.96; F(2, 287) = 9.13, p < .001$ ). When the brand promotions are identity irrelevant, participants correctly identified more old American brand coupons after sharing with best friend as compared to sharing on Facebook ( $p < .09$ ) or no sharing ( $p < .001$ ); The simple main effect of sharing was significant when the brand promotions were identity relevant ( $M_{\text{best\_friend}} = 4.29, M_{\text{Facebook}} = 5.33, M_{\text{nosharing}} = 4.75; F(2, 287) = 8.01, p < .001$ ). Participants identified less old American brand coupons in best friend condition as compared to Facebook ( $p < .001$ ) or no sharing condition ( $p < .09$ ).

*False Identification of Identity-Liked Promotions (New American brands).* Similar analyses on the false identification of identity-liked promotions revealed a significant interaction effect between sharing partner and identity relevance ( $F(2, 287) = 3.08, p < .05$ ). An examination of the pattern of means revealed that the simple main effect of social sharing was significant in the identity-relevant condition ( $M_{\text{best\_friend}} = .98, M_{\text{Facebook}} = .56, M_{\text{nosharing}} = .52; F(2, 287) = 3.37, p < .04$ ) but not in the control condition ( $p > .56$ ).

When the experience was identity relevant, the best friend created more false memories than Facebook ( $p < .04$ ) and no sharing ( $p < .03$ ). When the experience was identity irrelevant, there were no differences in false identifications of new American brands (all  $p$ 's  $> .1$ ).

#### 2.6.4 DISCUSSION

The results of study 1 suggest that although people can form quasi-social relationships with technologies such as Facebook, they do not regard them the same as human partners. Consumers forgot more details of their identity relevant experiences after sharing with best friend as compared to not sharing the experience at all. Sharing with Facebook functioned similar to acquaintances in a social sharing context and facilitated identity relevant memory retention. Moreover, the results also show that memory attenuation after sharing occurred not just for the memory of the experience (travel to Hong Kong), but also related brand promotions, suggesting that sharing may impair brand memory.

Nestojko et al. (2013) examine extending cognition to external agents and point out that internally stored memories yield more optimal cognitive functioning because they are easier to retrieve than externally stored memories. When people share their memories and outsource those memories to external storages (e.g. best friend, Google), they need to remember some other information to retrieve these memories (e.g. the label/keywords of the location), hindering the accessibility of the memories per se. Since accessibility is an important indicator of attitude strength (Fazio 1995), it is likely that consumers' attitude strength will be diluted due to this diminished memory accessibility after outsourcing to the memory cloud. Therefore, I predict that the memory decay will lead to lower attitude strength towards the object of the shared experience.

#### 2.7 STUDY 2

In study 2, I investigate whether a technology partner can act like a human partner if it has been imbued with some human characteristics (anthropomorphization). Since



Facebook may be more ambivalent in its perception of being a technological platform versus human friends, I create a purely technology platform as the stimulus for better experimental control in this study. In addition, the platform uses a fictional brand name to avoid differences in brand attitudes among respondents.

I predict that memory decay will be more (less) likely to occur when sharing identity relevant (irrelevant) experience to an anthropomorphized (objectified) technological outlet. Subsequently, attitude strength will be lower (higher) when sharing identity relevant experience with an anthropomorphized (objectified) outlet. The opposite is likely for identity irrelevant experience.

#### 2.7.1 PARTICIPANTS, DESIGN AND PROCEDURE

Three hundred and thirty-nine undergraduate students from a major university in U.S. participated a 2 (identity relevance: high vs. control) x 2 (sharing partner: best friend vs. anthropomorphized technology vs. objectified technology) between subject design study for course credit. The travel scenario and procedures were similar to study 1. After returning home from the Hong Kong tour, respondents either shared their experience verbally with a best friend or wrote a diary entry of the tour, and shared it using a hypothetical file hosting service platform FlyCloud (a Dropbox -like service).

Anthropomorphism was manipulated by reading a paragraph describing Flycloud using first person vs. third person pronouns (procedures adapted from Aggarwal and McGill 2007). Previous research has shown that using first person pronouns (e.g. Hi, my name is FlyCloud. My friends like to call my nick name “FireCow”. I’m good at cloud storage...) generates higher perceived anthropomorphism than using third person pronouns (e.g. FlyCloud is a file hosting service operated by FlyCloud, Inc.). To enhance the interacting

feature, they received the messages after sharing-”Thank you for sharing your experience with me (vs. on FlyCloud).”

After some filler tasks, recognition memory for the travel experience was measured by identifying correct information from a mixture of 12 correct and 12 false statements about the travel experience (Corrected Recognition with the score ranging from -12 to 12). Corrected recognition was computed by subtracting the false identification from total correct identification (Dalton and Huang 2014). Participants also reported their attitude towards the travel experience (favorable, desirable, enjoyable;  $\alpha = .97$ ), attitude confidence (adapted from Krosnick and Smith (1994); confident, strong, certain, firm, definite;  $\alpha = .98$ ) on 7-points Likert scales, as well as their willingness to pay for a similar tour to Hong Kong (range from \$500-\$3000).

## 2.7.2 RESULTS

*Corrected Recognition of Travel Experience.* An analysis of variance revealed a significant interaction between sharing partner and identity relevance on the corrected recognition of the travel experience ( $F(2,333) = 9.00, p < .001$ ). When the travel experience was identity relevant, participants forgot more details of the experience after sharing it with a best friend and sharing it with the anthropomorphized technology than the objectified technology ( $M_{\text{bestfriend}} = 4.04, M_{\text{anthropomorphized}} = 4.63, M_{\text{objectified}} = 6.23; F(2,333) = 8.42, p < .001$ ); As predicted, the best friend and anthropomorphized technology conditions did not differ significantly ( $p > .27$ ). When the experience was identity irrelevant, there were no significant differences ( $M_{\text{bestfriend}} = 5.78, M_{\text{anthropomorphized}} = 5.64, M_{\text{objectified}} = 4.91; F(2, 333) = 1.69, p > .18$ ).

*Total Recognition of the Travel Experience.* An analysis of variance revealed a significant main effect of identity relevance ( $F(1, 333) = 3.99, p < .05$ ) and an interaction between sharing partner and identity on total recognition ( $F(2, 333) = 6.69, p < .01$ ). The simple contrasts followed the expected patterns. For the identity relevant travel experience, respondents correctly identified less of the travel information when it was shared with a best friend and the anthropomorphized technology than the objectified technology ( $M_{\text{bestfriend}} = 6.49, M_{\text{anthropomorphized}} = 6.79, M_{\text{objectified}} = 7.96; F(2, 333) = 5.40, p < .01$ ). As predicted, the best friend and anthropomorphized technology conditions did not differ significantly ( $p > .52$ ). For the identity irrelevant travel experience, there were no significant differences ( $M_{\text{bestfriend}} = 7.96, M_{\text{anthropomorphized}} = 7.70, M_{\text{objectified}} = 7.15; F(2, 333) = 4.33, p > .18$ ).

*False Recognition of the Travel Experience.* There was a marginally significant interaction between the sharing partner and identity relevance on false recognition ( $F(2, 333) = 2.41, p < .10$ ). For the identity relevant travel experience, participants had more false recognition when sharing with the best friend than the objectified technology ( $M_{\text{bestfriend}} = 2.45, M_{\text{anthropomorphized}} = 2.16, M_{\text{objectified}} = 1.73; F(2, 333) = 3.27, p < .04$ ). There were no significant differences when the travel experience was identity irrelevant ( $M_{\text{bestfriend}} = 2.16, M_{\text{anthropomorphized}} = 2.06, M_{\text{objectified}} = 2.25; F(2, 333) = .27, p < .76$ ).

*Attitude Confidence.* An analysis of variance revealed a marginally significant interaction between sharing partner and identity-relevance on attitude confidence ( $F(2, 333) = 2.54, p < .09$ ). For the identity relevant travel experience, respondents showed lower confidence in their attitude towards the experience after sharing with the best friend and the anthropomorphized technology as compared to the objectified technology

( $M_{\text{bestfriend}} = 4.85$ ,  $M_{\text{anthropomorphized}} = 5.15$ ,  $M_{\text{objectified}} = 5.69$ ;  $F(2, 333) = 5.21$ ,  $p < .01$ ). For the identity-neutral travel experience, there were no significant differences on attitude confidence ( $M_{\text{bestfriend}} = 5.29$ ,  $M_{\text{anthropomorphized}} = 5.25$ ,  $M_{\text{objectified}} = 5.32$ ;  $F(2, 333) = .04$ ,  $p > .95$ ).

*Mediating Role of Recognition Memory on Attitude Confidence.* To test whether corrected recognition of travel experience mediated the interaction of sharing partner and identity relevance on attitude confidence, 5,000 bootstrap resamples were performed using Hayes' (2014) SPSS macro for model 8. The model specified Y (i.e., the DV) as attitude confidence, X (i.e., the IV) as sharing partner, M (i.e., the mediator) as corrected recognition of travel experience, and W (i.e., the moderator) as identity relevance. The 95% confidence interval (bias-corrected) of the indirect pathway from sharing partner \* identity relevance to the DV via the mediator excluded zero (.0599 to .2842; Effect = .1482; SE = .0563). I therefore conclude that recognition memory mediates the interaction of sharing partner and identity relevance on attitude confidence. In the identity relevance condition, the 95% confidence interval (bias-corrected) for the conditional indirect effect of sharing partner on attitude confidence via the mediator excluded zero (.0415 to .2035; Effect = .1050; SE = .0409); in the control condition, it also excluded zero (-.1136 to -.0018; Effect = -.0432; SE = .0272). I therefore conclude that recognition memory mediated the effect of sharing partner on attitude confidence in both conditions.

*Attitude/Purchase Likelihood.* Similar analyses were conducted but there were no significant interactions between sharing partners and identity relevance on attitude towards the travel experience ( $p > .88$ ) and willingness to pay ( $p > .63$ ), suggesting that memory decay after outsourcing may not directly affect consumer's overall attitudes but

have more subtle influences on attitude strength. These null findings are consistent with the findings from essay 1.

### 2.7.3 DISCUSSION

Study 2 provides evidence that anthropomorphism can impact the perception of technological partner and influences the social sharing outcomes. Technological partners can elicit memory outsourcing like human close friends when they have essential humanized qualities. Consistent with previous findings, memory decay after outsourcing is less likely to impact overall experience per se but has a greater impact on attitude strength. This study not only showcases that the technological partners can to some extent substitute human partners when they are anthropomorphized, but also implies that perceived partner quality is important when sharing identity relevant experiences.

### 2.8 STUDY 3

Memory outsourcing outcome is subject to future accessibility. Prior research on group collaboration finds that group performance may be impaired if the group members' smooth coordination encounters disruptions. For example, the sudden membership change leads to roles ambiguity (Lewis et al. 2007); asking a domain-unrelated question interrupts the TMS process flow (Akgün et al. 2005). Likewise, the outcome of social sharing with technology should be quite sensitive to the cue of accessibility.

Sparrow and Chatman (2013) assert that information from search engines causes an illusory sense of control due to the fast speed of access. Ward (2013) demonstrates that the fast speed of Internet can blur the boundaries of self and the Internet such that people perceive the ability of Internet as own and also take the credits of Internet-related outcomes. In one study, participants completed a trivia quiz with or without the help of

Internet and then were measure the cognitive self esteem (CSE) and predicted how well they would perform on a second quiz without any external resources. Participants who used (versus. who did not use) the Internet for the first quiz report higher (lower) CSE and believed they could do better (worse) on the second quiz without the Internet. The authors believe that the fast and virtual nature of retrieving the information from the Internet make people mistakenly attribute Internet ability to own ability and lead to overconfidence. Interestingly, when the participants were forced to use a slower Internet browser, these effects disappeared. This finding implies that fast information accessibility enhances the human-technology interaction and creates illusions of “Internet brain is my brain”.

Recent work by Bhargave, Mantonakis, and White (2016) find that reminding the offline consumers the accessibility of product information online can enhance consumer’s confidence and increase their offline purchase intention. They suggest that the belief that that they can access the information any time is critical for the consumers’ confidence. In the same way, confidence in retain the information from the memory cloud any time will affect to what degree people rely on the memory cloud. The more reliance on the memory could, the more likely they will feel relief to offload the memories.

Analogously, altering the accessibility should impact the perception of technology partner-particularly its accountability. When perceived future accessibility is high, social sharing process will be smooth and people can rely on the anthropomorphized technology like human partners. However, if the future accessibility if low, the memory outsourcing outcome is likely to be disrupted and consumers may realize that technologies are not so dependable.

Thus, I predict that when the anthropomorphized technology partner's accessibility is high (low), memory outsourcing will be amplified (attenuated). Consequently, consumers in identity relevant conditions will offload more (fewer) memories to the technology partner after sharing. No such differences will emerge when the experience is identity irrelevant.

#### 2.8.1 PARTICIPANTS, DESIGN AND PROCEDURE

Two hundred and seven undergraduate students from a major university in U.S. participated a 2 (identity relevance: high vs. low) x 3 (sharing partner: accessible anthropomorphized technology vs. inaccessible anthropomorphized technology vs. objectified technology) between subject design study for course credit. A new scenario was used for generalization purpose. American nationality identity was manipulated by going to a high-tech fair on the Independent Day (vs. a public holiday) and visiting a booth by American firm (vs. a Japanese firm). They received the brochure with the detailed introduction of a new product (a portable translator). They were encouraged to fully encode the product information for answering the questions afterwards. Then they were directed to share this experience on a hypothetical high-tech review site ([www.techbyte.com](http://www.techbyte.com)). The anthropomorphism manipulation was the same as in study 2. After the sharing task, they received a feedback message- "Thank you for sharing your experience on Techbyte (Objectified technology condition); "Thank you for sharing your experience with me. My friend! You can count on me. I will be always here to help because that's what friends are supposed to do (Accessible anthropomorphized technology condition); "Thank you for sharing your experience with me! My friend! Due to the system adjustment, I'm temporally unavailable. You may see me on and off

occasionally and sometimes you may not be able to reach me immediately. Sorry for the inconveniences caused.” (Inaccessible anthropomorphized technology condition).

After some filler tasks, recognition memory for the fair experience was measured by identifying correct information from a mixture of 15 correct and 15 false statements about the travel experience (Corrected Recognition with the score ranging from -15 to 15). Corrected recognition was computed by subtracting the false identification from total correct identification (Dalton and Huang 2014). Participants also reported their attitude towards the travel experience (favorable, desirable, enjoyable;  $\alpha = .97$ ), attitude confidence (adapted from Krosnick and Smith (1994); confident, strong, certain, firm, definite;  $\alpha = .98$ ) on 7-points Likert scales, as well as their willingness to pay for a similar tour to Hong Kong (range from \$500-\$3000).

## 2.8.2 RESULTS

*Corrected Recognition of Product Experience.* An analysis of variance revealed a significant main effect of sharing partner ( $F(2,201) = 9.97, p < .001$ ) and an interaction between sharing partner and identity relevance on the corrected recognition of the product experience ( $F(2,201) = 3.62, p < .03$ ). When the product experience was identity relevant, participants remembered less details of the experience after sharing it with an accessible anthropomorphized technology than the inaccessible anthropomorphized technology and the objectified technology ( $M_{\text{accessibleAnthropomorphized}} = 4.88$ ,  $M_{\text{inaccessibleanthropomorphized}} = 8.38$ ,  $M_{\text{objectified}} = 8.32$ ;  $F(2,201) = 12.8, p < .001$ ); As predicted, the inaccessible anthropomorphized technology became no differences from the objectified technology ( $p > .93$ ). When the experience was identity irrelevant, there



were no significant differences ( $M_{\text{accessibleAnthropomorphized}} = 6.56$ ,  $M_{\text{inaccessibleanthropomorphized}} = 7.38$ ,  $M_{\text{objectified}} = 7.46$ ;  $F(2,201) = .82$ ,  $p > .44$ ).

*Total Recognition of the Product Experience.* An analysis of variance revealed a significant main effect of sharing partner ( $F(2,201) = 8.22$ ,  $p < .001$ ) and a non-significant interaction between sharing partner and identity relevance on total recognition ( $F(2, 201) = 1.91$ ,  $p > .15$ ). However, the simple contrasts followed the expected patterns. For the identity relevant product experience, respondents correctly identified less of the product information when it was shared with an accessible anthropomorphized technology than the inaccessible anthropomorphized technology and the objectified technology ( $M_{\text{accessibleAnthropomorphized}} = 7.70$ ,  $M_{\text{inaccessibleanthropomorphized}} = 10.4$ ,  $M_{\text{objectified}} = 10.0$ ;  $F(2,201) = 9.10$ ,  $p < .001$ ). As predicted, the inaccessible anthropomorphized technology and the objectified technology conditions did not differ significantly ( $p > .52$ ). For the identity irrelevant travel experience, there were no significant differences ( $M_{\text{accessibleAnthropomorphized}} = 8.53$ ,  $M_{\text{inaccessibleanthropomorphized}} = 9.38$ ,  $M_{\text{objectified}} = 9.54$ ;  $F(2,201) = 1.27$ ,  $p > .28$ ).

*False Recognition of the Product Experience.* There was a marginally significant interaction between the sharing partner and identity relevance on false recognition ( $F(2,201) = 2.99$ ,  $p < .06$ ). For the identity relevant product experience, participants had more false recognition when sharing with the accessible anthropomorphized technology than the other two conditions ( $M_{\text{accessibleAnthropomorphized}} = 2.82$ ,  $M_{\text{inaccessibleanthropomorphized}} = 2.05$ ,  $M_{\text{objectified}} = 1.68$ ;  $F(2,201) = 4.84$ ,  $p < .01$ ). There were no significant differences when the product experience was identity irrelevant ( $M_{\text{accessibleAnthropomorphized}} = 1.97$ ,  $M_{\text{inaccessibleanthropomorphized}} = 2.00$ ,  $M_{\text{objectified}} = 2.07$ ;  $F(2,201) = .05$ ,  $p > .95$ ).

*Attitude Confidence.* An analysis of variance revealed a significant interaction between sharing partner and identity-relevance on attitude confidence ( $F(2, 201) = 4.27$ ,  $p < .02$ ). For the identity relevant product experience, respondents showed lower confidence in their attitude towards the product after sharing with the accessible anthropomorphized technology as compared to the inaccessible anthropomorphized technology and the objectified technology ( $M_{\text{accessibleAnthropomorphized}} = 4.65$ ,  $M_{\text{inaccessibleanthropomorphized}} = 5.44$ ,  $M_{\text{objectified}} = 5.56$ ;  $F(2, 201) = 6.27$ ,  $p < .01$ ). For the identity-irrelevant travel experience, there were no significant differences on attitude confidence ( $M_{\text{accessibleAnthropomorphized}} = 5.44$ ,  $M_{\text{inaccessibleanthropomorphized}} = 5.23$ ,  $M_{\text{objectified}} = 5.34$ ;  $F(2, 201) = .22$ ,  $p > .80$ ).

*Mediating Role of Recognition Memory on Attitude Confidence.* To test whether corrected recognition of product experience mediated the interaction of sharing partner and identity relevance on attitude confidence, 5,000 bootstrap resamples were performed using Hayes' (2014) SPSS macro for model 8. The model specified Y (i.e., the DV) as attitude confidence, X (i.e., the IV) as sharing partner, M (i.e., the mediator) as corrected recognition of product experience, and W (i.e., the moderator) as identity relevance. The 95% confidence interval (bias-corrected) of the indirect pathway from sharing partner \* identity relevance to the DV via the mediator excluded zero (-.2997 to -.0224; Effect= -.1257; SE= .0678). I therefore conclude that recognition memory mediates the interaction of sharing partner and identity relevance on attitude confidence. In the identity relevance condition, the 95% confidence interval (bias-corrected) for the conditional indirect effect of sharing partner on attitude confidence via the mediator excluded zero (-.3323 to -.0656; Effect= -.1674; SE= .0669); in identity-irrelevant condition, it included zero (-

.1510 to .0254; Effect= -.0417; SE= .0436). I therefore conclude that recognition memory mediated the effect of sharing partner on attitude confidence in identity relevant condition but not in identity irrelevant condition.

*Attitude/Purchase Likelihood.* Similar analyses were conducted but there were no significant interactions between sharing partners and identity relevance on attitude towards the product ( $p > .45$ ) and purchase likelihood ( $p > .23$ ), replicating the findings from study 2.

### 2.8.3 DISCUSSION

Study 3 extends study 2's findings and shows that even the technology is anthropomorphized, sharing with it may not lead to memory decay. Rather, perceived partner accessibility moderates this effect such that lowered accessibility attenuates memory outsourcing and subsequent decay. It should be noted that the accessibility manipulation happened post-sharing, which implies that memory decay is not due to the differences on encoding or sharing amount, but due to the perceptions of sharing partner. To uncover the underlying mechanism, I test perceive partner quality as the mediator in study 4. Further, research shows that the different roles (e.g. partner or servant) that anthropomorphized objects play can elicit different responses from their interacting partners. This suggests that even when technological partners are anthropomorphized, they can potentially have different effects on memories and attitudes based on the type of role they assume (servant vs partner). I examine the effect of such different roles in Study 4.

## 2.9 STUDY 4

Marketers often imbue their brands with particular roles through advertising (e.g. “Mr. Clean is your cleaning partner”). It is not surprising that technologies can be presented as, and be interpreted as a partner or a servant, when they are anthropomorphized (Kim and Kramer 2015). For instance, some people regard computer, smartphone and Internet “working with” them and they are friends and partners (e.g. Landwehr et al. 2011) while some people regard those technological devices “work for” them and perceive a master-servant type relationship (Wang et al. 2007). Different social roles are correlated with distinctive behavior codes or expectations that influence others respond to the people with specific roles. Aggarwal and McGill (2012) investigated consumer’s assimilative responses to the brands playing partner or servant roles and found that while the partner role can satisfy the need for social bonding and provide emotional support, the servant role can serve the master and offer functional benefits. Kim and Kramer (2015) showed that a servant brand is appealing to materialistic consumers who desire a dominant relationship. When sharing identity relevant experience, a partner-alike audience who can understand you and provide emotional support to you may be better than a servant-alike audience who only cares “getting the task done”. Thus, I predict that the forgetting-after-sharing effect will be more pronounced when the interacting technology is perceived as a partner as compared to a servant.

### 2.9.1 PARTICIPANTS, DESIGN AND PROCEDURE

Study 4 was a 2 identity relevance (high vs. low) x 3 sharing partner (servant vs. partner vs. objectified technology) between subject design with 239 undergraduate

students. The same travel experience was used and the target technology was a blogging platform named Travelgger. To manipulate the different roles it played, respondents were randomly assigned to either servant or partner condition (procedures adopted from Aggarwal & McGill, 2012). Participants in the partner condition read, “Travelgger wants to present its image as the one that partners with the customer. Please think about how it can co-create value and work with you.” Those in the servant condition read “Travelgger wants to present its image as the one that best serves the customers. Please think about how it can serve and work for you.” Then they were exposed to a self-introduction of Travelgger using the first-person pronoun and encouraged to share their entire travel experience on this blogging platform.

Besides recognition memory of travel experience, we measured their Perceived relationship quality of the technology by 7 items such as “Travelgger takes care of me,” “Travelgger listens to me,” and “I can count on Travelgger to do what’s best for me,” on a 7-point likert scale (1=strongly disagree to 7=strongly agree;  $\alpha = .95$ ; Fournier 1998). In addition, perceived memory specialness was measured by asking them to indicate “If it was real, please evaluate how special this travel experience would be in your life.”

## 2.9.2 RESULTS

*Corrected Recognition of Travel Experience.* An analysis of variance revealed a marginally significant interaction between sharing partner and identity relevance on the corrected recognition of the travel experience ( $F(2,231) = 2.94, p < .06$ ). When the travel experience was identity relevant, participants forgot more details of the experience after sharing it with a partner-alike technology than the servant-alike technology and the objectified technology ( $M_{\text{partner}} = 4.94, M_{\text{servant}} = 6.21, M_{\text{objectified}} = 6.66; F(2,231) = 3.32, p$

< .04); As predicted, the servant and objectified technology conditions did not differ significantly ( $p > .49$ ). When the experience was identity neutral, there were no significant differences ( $M_{\text{partner}} = 6.17$ ,  $M_{\text{servant}} = 5.47$ ,  $M_{\text{objectified}} = 5.65$ ;  $F(2, 231) = .49$ ,  $p > .61$ ).

*Total Recognition of the Travel Experience.* An analysis of variance revealed a significant interaction between sharing partner and identity relevance on total recognition ( $F(2, 231) = 4.05$ ,  $p < .02$ ). For the identity relevant travel experience, respondents correctly identified less of the travel information when it was shared with a partner-alike technology than servant-alike technology and the objectified technology ( $M_{\text{partner}} = 7.33$ ,  $M_{\text{servant}} = 8.46$ ,  $M_{\text{objectified}} = 8.92$ ;  $F(2, 231) = 6.65$ ,  $p < .01$ ). As predicted, the servant and objectified technology conditions did not differ significantly ( $p > .31$ ). For the identity neutral travel experience, there were no significant differences ( $M_{\text{partner}} = 8.40$ ,  $M_{\text{servant}} = 8.09$ ,  $M_{\text{objectified}} = 8.26$ ;  $F(2, 231) = .21$ ,  $p > .81$ ).

*False Recognition of the Travel Experience.* There was no significant interaction between the sharing partner and identity relevance on false recognition ( $F(2, 231) = .69$ ,  $p > .50$ ). For the identity relevant travel experience, participants had more false recognition when sharing with the best friend than the objectified technology ( $M_{\text{partner}} = 2.39$ ,  $M_{\text{servant}} = 2.26$ ,  $M_{\text{objectified}} = 2.26$ ;  $F(2, 231) = .09$ ,  $p > .91$ ). There were no significant differences when the travel experience was identity neutral ( $M_{\text{partner}} = 2.23$ ,  $M_{\text{servant}} = 2.62$ ,  $M_{\text{objectified}} = 2.61$ ;  $F(2, 231) = .74$ ,  $p > .47$ ).

*Perceived Partner Quality.* An analysis of variance revealed a significant main effect of sharing partner ( $F(1, 231) = 8.56$ ,  $p < .001$ ), identity relevance ( $F(1, 231) = 4.02$ ,  $p < .05$ ) and an interaction between these two variables on perceived partner quality ( $F(2,$

231) = 3.90,  $p < .03$ ). For the identity relevant travel experience, respondents perceived higher partner quality after sharing with the partner-alike technology than the other two conditions ( $M_{\text{partner}} = 4.93$ ,  $M_{\text{servant}} = 4.02$ ,  $M_{\text{objectified}} = 3.50$ ;  $F(2,231) = 12.2$ ,  $p < .001$ ). For the identity neutral travel experience, participants showed no significant differences on perceived partner quality ( $M_{\text{partner}} = 3.90$ ,  $M_{\text{servant}} = 3.91$ ,  $M_{\text{objectified}} = 3.60$ ;  $F(2,231) = .70$ ,  $p > .49$ ).

*Mediating Role of Perceived Partner Quality on Recognition Memory.* To test whether perceived partner quality mediated the interaction of sharing partner and identity relevance on recognition memory, 5,000 bootstrap resamples were performed using Hayes' (2014) SPSS macro for model 8. The model specified Y (i.e., the DV) as corrected recognition of travel experience, X (i.e., the IV) as sharing partner, M (i.e., the mediator) as perceived partner quality, and W (i.e., the moderator) as identity relevance. The 95% confidence interval (bias-corrected) of the indirect pathway from sharing partner \* identity relevance to the DV via the mediator excluded zero (-.7163 to -.0011; Effect = -.2924; SE = .1816). I therefore conclude that perceived partner quality mediates the interaction of sharing partner and identity relevance on recognition memory. In the identity relevance condition, the 95% confidence interval (bias-corrected) for the conditional indirect effect of sharing partner on recognition memory via the mediator excluded zero (-.6301 to -.0663; Effect = -.2903; SE = .1397). ; in identity neutral condition, it included zero (-.2145 to .2288; Effect = .0021; SE = .1087) I therefore conclude that perceived partner quality mediated the effect of sharing partner on recognition memory in identity relevant condition but not in identity neutral condition.

*Perceived Experience Specialness.* An analysis of variance revealed a significant interaction between two independent variables on perceived experience specialness ( $F(2, 231) = 5.92, p < .01$ ). For the identity relevant travel experience, respondents perceived their experience less special after sharing with the partner-alike technology than the other two conditions ( $M_{\text{partner}} = 4.50, M_{\text{servant}} = 5.56, M_{\text{objectified}} = 5.22; F(2, 231) = 3.76, p < .03$ ). For the identity neutral travel experience, participants perceived their experience more special after sharing with the partner-alike technology than the other two conditions ( $M_{\text{partner}} = 5.57, M_{\text{servant}} = 4.82, M_{\text{objectified}} = 4.77; F(2, 231) = 2.51, p < .09$ ).

#### 2.9.4 DISCUSSION

Study 4 shows that within anthropomorphism, there are still variances in partner quality. The roles the technologies play affect the way the sharers remember the information shared. More importantly, this study provides evidence for the perceived partner quality as the underlying mechanism and uncovers the consequences of perceived specialness of the experience. When people offload details of the experience to the technological partner, they perceive the experience shared as being less special.

#### 2.10 GENERAL DISCUSSION

As technologies are woven into our daily life, there is concern expressed about the potential negative impact of over-reliance on technologies. Some researchers caution that excessive technology use is making us more impatient, impulsive, forgetful, and more narcissistic (Parker-pope 2010). Sparrow and Chatman (2013) suggest that digitally mediated communication has changed our brain's cognitive functioning and challenged the applicability of some traditional theories. Is reliance upon technology making us forgetful? Recent research by Sparrow et al. (2011) suggests that this may be the case.



My research extends this line of inquiry by looking at technology dependency in a different context—a fundamental yet important behavior (social sharing). I find that memory decay after sharing with technology is only possible when the technology has been anthropomorphized and the memories are important to save (e.g. identity relevant), but is less likely when the technology is seen as a mindless machine and the memories are not worth remembering. My work thus documents a novel and important effect of social sharing on technologies.

Across four studies, I find that not all technology dependency may be harmful for human cognition. In a social sharing context, anthropomorphized technologies (objectified technologies) with higher (lower) perceived partner quality are more (less) likely to decay identity-linked memories, dilute attitude confidence, and decrease perceptions of experience specialness.

Marketers have taken for granted that close relationships are beneficial to the consumers and the firms which has led to widespread use of anthropomorphism strategies on social media sites. However, counter-intuitively, my research finds that anthropomorphism can have some “dark sides”. Dependence on an anthropomorphized technology could undermine consumer memories because we are more likely to create a memory cloud with a trustworthy, safe, dependable, accessible (high quality) humanlike partner than a mindless machine. Delegating the responsibility of retaining and accessing our meaningful memories to the humanized technology freedom our brain to forget the details of those memories and ironically lead to memory decay. Different from the most of the marketing literature showing the positive effects of anthropomorphism (Chandler and Schwarz 2010; Ahn, Kim, and Aggarwal 2014), the current research examines the

potential negative consequences of anthropomorphism on human cognition, a significant area has been understudied.

To deepen our understanding of the entire process, I investigate the moderators of such backfiring effect. Study 3 finds that the memory cloud with anthropomorphized technology is sensitive to its accessibility. Simply altering the accessibility of anthropomorphized technology can attenuate memory decay. Interestingly, Ward (2013) discussed the benefits of accessibility on human cognition (e.g. increased confidence by mistakenly regarding the knowledge online as knowledge in our brain). My findings show the other side of this issue - inaccessibility can reduce over-dependency on the humanized technology and hinder forgetting. I further suggest that not all humanized technologies are equally dangerous. Study 4 examines the different roles that anthropomorphized technologies play and finds that roles with lower perceived quality partner (e.g. servant) may not triggers memory outsourcing to the same extent as those with high quality partner (e.g. partner). Therefore, positioning the technology as a servant will also lessen memory attenuation.

#### 2.10.1 THORETICAL AND PRACTICAL CONTRIBUTION

The current research extends our understanding of social sharing effects to a human-technology interaction context. In particular, this research is the first empirical evidence of the cognitive differences between sharing with human and nonhuman partners. I build a new theoretical framework to uncover this process and find that the characteristics of the experience (identity relevant) and the perceptions of technological partner (anthropomorphism, roles, accessibility) have joint-functions on consumer memories. I find that perceived partner quality is particularly important for sharing

personally meaningful memories. This finding adds to our knowledge about social identity memory protection. It suggests that identity memory protection may be more complicated than we thought because it not only desires a safe repository but also requires social appreciation/valuation.

Second, I find a novel and intriguing effect that anthropomorphism of technology can hinders consumer identity memory. The dark sides of anthropomorphism have received scant attention. Only recently have some researchers documented the negative effects of it on self-regulation (Hur, Koo, and Hofmann 2015), brand publicity (Puzakova, Kwak, and Rocereto 2013), and enjoyment of computer games (Kim, Chen and Zhang 2016). The current research fills the gap of how anthropomorphism impacts consumer's memory. This research provides an initial step to study how anthropomorphism of an object can change the way we encode, retrieve, and process the information.

Third, these findings also contribute to the literature on word-of-mouth effects in marketing by enhancing our understanding of how WOM spread via technologies such as the Internet and social media may impact consumer memories. While prior research on WOM has only answered “what we share” (Barasch and Berger 2014; Chen and Berger 2016) and “how we share” (Moore 2012), little is known about the cognitive impacts of the act of sharing on the speaker per se. The current research fills this spotting hole in e-WOM literature.

There are important implications for online marketing practice. For example, while anthropomorphism is often encouraged for social media marketing, engaging consumers to share brand memories may be detrimental if they perceive the technologies

(e.g. smartphone, social media) like human partners or if they interacted with an anthropomorphized brand. The valuable details of promotions (e.g. brand name, features, price, place) may be lost post sharing. The online avatars, humanized assistants, interpersonal messages should be carefully designed. Focusing the objectified characteristics of technology or framing a servant role can reverse these results and limit the “dark sides” of technology dependency.

The current research contributes a better guide for the blooming cloud storage market. According to the latest report (Markets and Markets 2016), the cloud storage market size is estimated to grow from 23.76 billion in 2016 to 74.94 billion USD by 2021. The companies (e.g. Dropbox, Google Drive, icloud, Microsoft Azure, Amazon Web Services S3) are battling to attract more users to use their cloud services. Most of them only highlight the competence of their storage service “e.g. Dropbox slogan ‘Keep your memories safe’”. However, according to my research, the identity relevant memories are those people most want to save and require not only safe storage but also warm concern. A slogan with some social cues such as “we understand how meaningful your memories are and we keep them safe” may be more appealing to the consumers sharing their personal memories.

## 2.10.2 LIMITATIONS AND FUTURE RESEARCH

The current research has some constraints and opens the door to further exploration of social sharing effects. Admittedly, I only used experiences that involved many details because I theorize memory cloud is most relevant when the cognitive efficiency motive is salient. When there is a need to reduce cognitive burden, there is a

tendency to rely on memory cloud. The memory decay effect may be less likely if people only share a little information on technological platforms.

Further, I only tested identity relevant experience because it is one of the most valuable memories we cherish (want to save) and we often share. While I insist that identity relevant memories are more likely to be offloaded to the memory cloud than identity neutral ones, I do not deny that other meaningful memories (even may be not identity relevant) can subject to memory decay effects (as long as people desire to save them). It would be interesting to test how the ordinary experience could be outsourced and forgotten if we heightened its “need-to-be-remembered”. For example, an advertising calling the consumers “Don’t forget to mail your rebate before Sep 1<sup>st</sup>” (vs. “The rebate deadline is Sep 1<sup>st</sup>”) may be more (less) easily to be forgotten if they perceived they have already backed it up somewhere (e.g. told the spouse). Thus, the researchers work on marketing communication can look at how the different languages, words, pronounce, etc. can be more or less likely to activate memory cloud effect.

Notably, people outsource their memories in order to backup and save them; the memory decay is probably an unexpected outcome after backing up (as in my Essay 1 study 5 suggests, their perceived memory strength shows the opposite pattern). Consequently, people perceive well remembering the information they actually do not recall well may lead to many subsequent consequences on consumer behaviors. For instance, becoming over-confidence in making the decisions, over-estimate of the self-performance, etc. Some behaviors may be boosted by the perceptual confidence while some behaviors do rely on actual memory performance can be undermined by this over-confidence. As a result, the large gap between the estimated-self and actual self can

decrease self-esteem and induce other mental problems and influence happiness in the long run. Therefore, my research can inspire multi-disciplines researchers to further investigate the consequences of memory cloud effect in other domains.

Technology is powerful. Having the memory cloud with the technical partner may change the experience of power (how it feels to have or lack power) (Rucker, Hu and Galinsky 2014). Interacting with technological outlets, people may either feel “my brain is unlimited” or “I’m inferior to the technology”. It is worthy studying the possibility that anthropomorphized technology empowers the consumers while the objectified technology make people powerless. The experience of lacking power often makes consumers to seek status goods (Dubois, Rucker, and Galinsky 2010). After sharing with technological humanlike partner, will they show less interest in the high-status goods as compared to those sharing with objectified technology?

Why do consumers outsource their meaningful memories rather than remembering them internally? One reason could be there are too many memories to remember internally (cognitive overload). The other reason could be offloading them for future savoring. The current research is based on the assumption that people often backup something they do not use now but may use in the future. Thus, another interesting moderator could be temporal focus. When people focus on future, memory cloud effect is more likely (backup + forget); when people focus on present, memory cloud effect is less likely (backup + remember it personally).

Future research can also take the culture differences into consideration. My current research studied only American participants. However, the memory cloud effect is related to cognitive interdependency. Prior research finds that there are culture

differences on how people relate to others (Triandis 1989; Roth 1995). It might be possible that the memory cloud effect can be amplified among the easterners because they are more interdependent than the westerners. In addition, they have higher anthropomorphism tendency than their western counterparts (Ghuman et al. 2015). Therefore, they can engage better in human-technology interaction and regard the anthropomorphized technology a dependable partner.

Further studies can also investigate other moderators such as sharer characteristics (e.g. materialists), technological outlet characteristics (one-way vs. two-way interactive; social media vs. pure technology device; audience size big vs. small) and experience characteristics (emotional vs. non-emotional; hedonic vs. utilitarian).

## 2.11 CONCLUSION

Digital sharing has taken a more important role than it has ever been. Berger (2014) indicates that sharing is currency in the social media world. I extended the social sharing research by documenting an intriguing effect that technologies can lead to identity memory decay when they have human interacting features. I show that this effect is moderated by the accessibility of the technology and the roles they play and is mediated by perceived partner quality. My results have implications for research on social sharing, anthropomorphism, social identity, and consumer memory. They provide practical guides to the marketers who want to encourage consumers to share (Amazon, TripAdvisor, Yelp, Facebook, etc.) and the brands who are interested in the consequences of such sharing on their actual customers (sharers).

## ESSAY 2 FIGURES

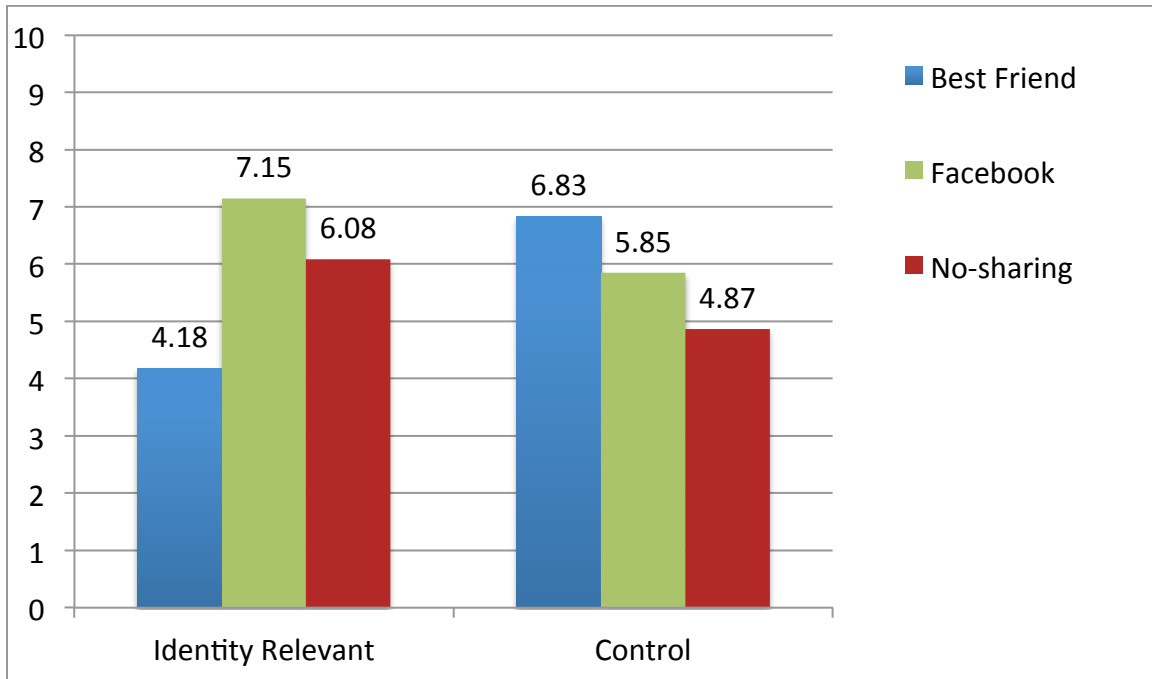


Figure 2.1: Study 1 Corrected Recognition by Sharing Partner and Identity Relevance



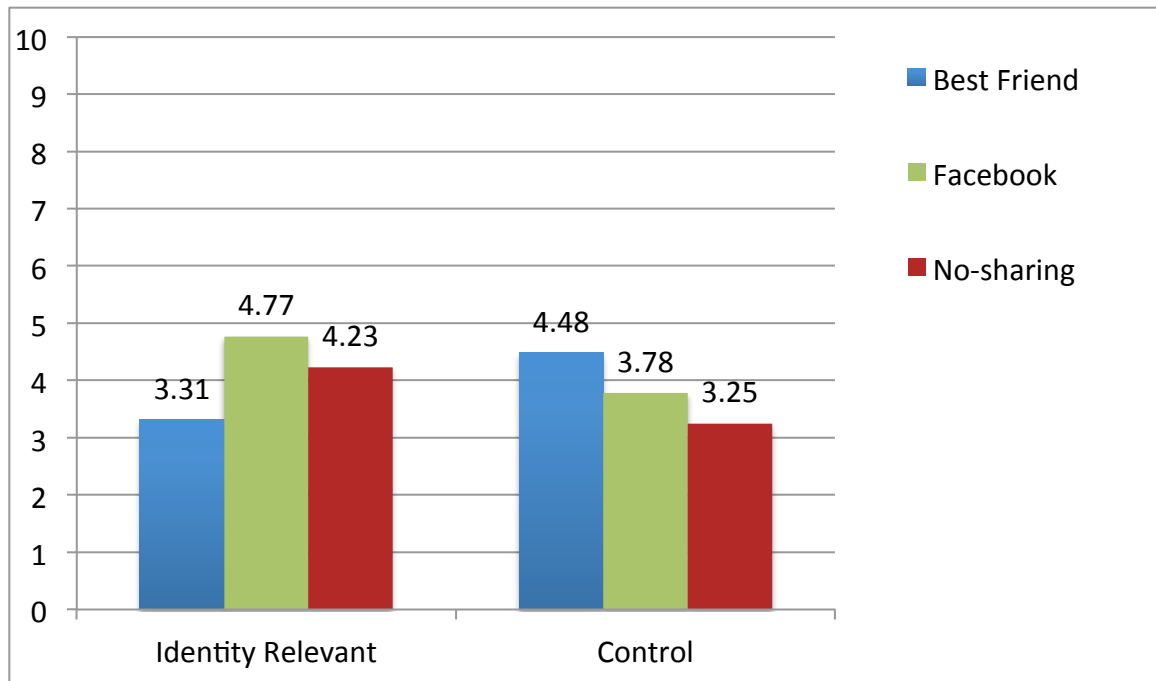


Figure 2.2: Study 1 Corrected Hits by Sharing Partner and Identity Relevance

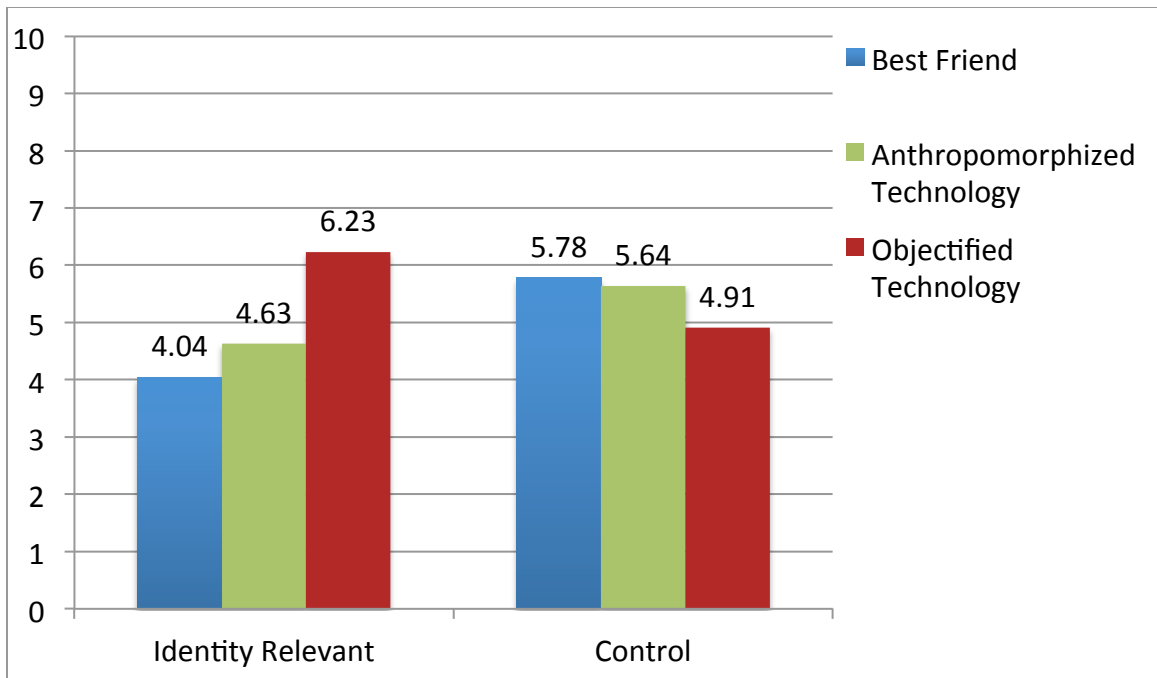


Figure 2.3: Study 2 Corrected Recognition by Sharing Partner and Identity Relevance

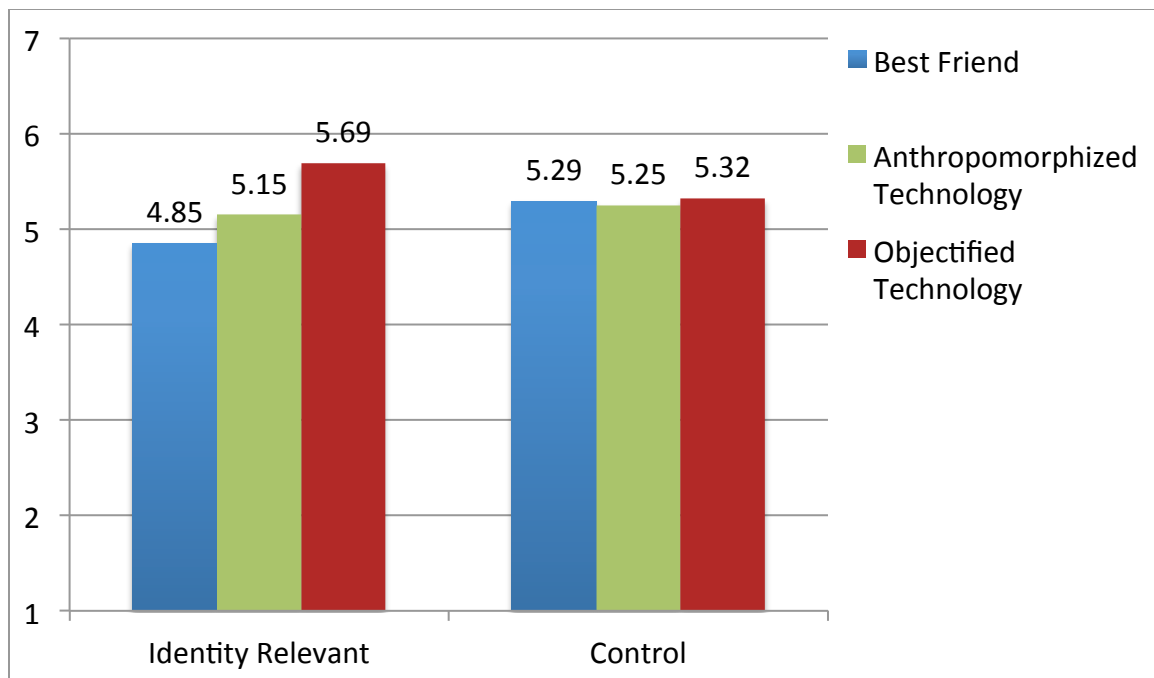


Figure 2.4: Study 2 Attitude Confidence by Sharing Partner and Identity Relevance

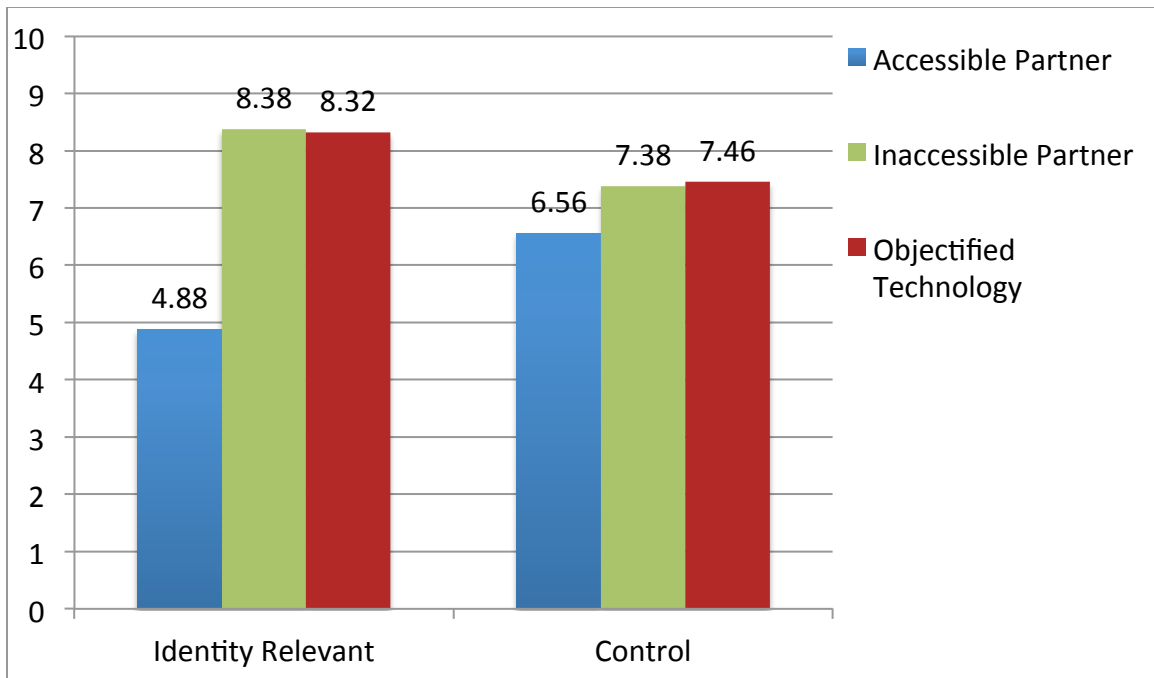


Figure 2.5: Study 3 Corrected Recognition by Sharing Partner and Identity Relevance

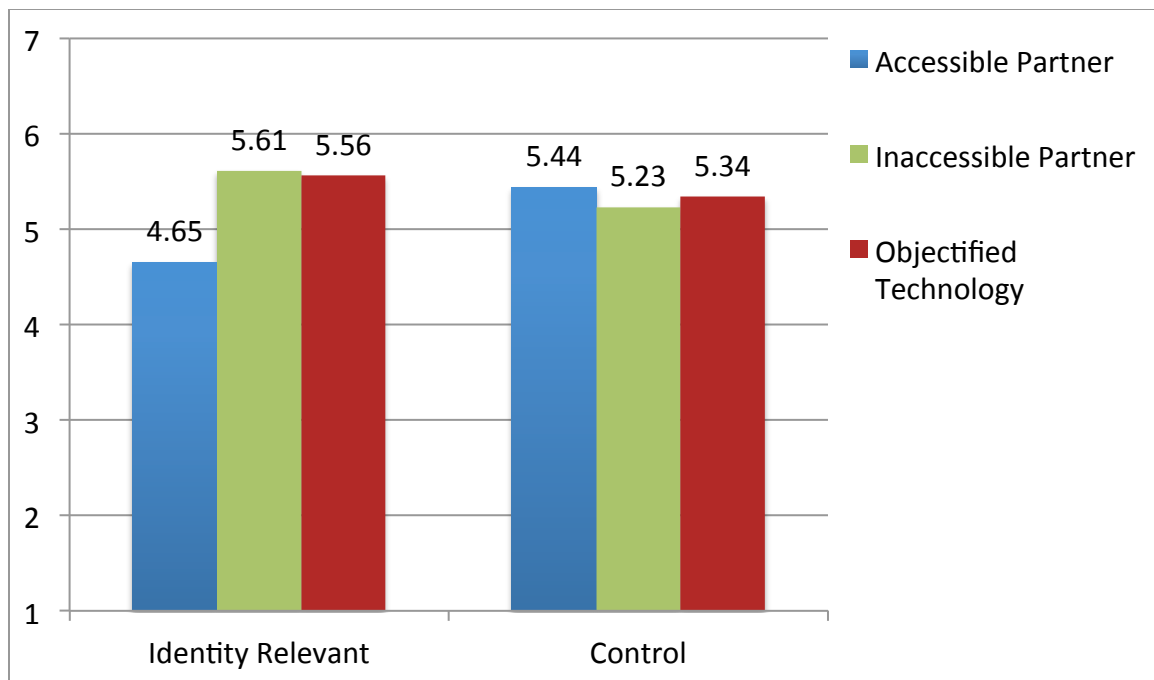


Figure 2.6: Study 3 Attitude Confidence by Sharing Partner and Identity Relevance

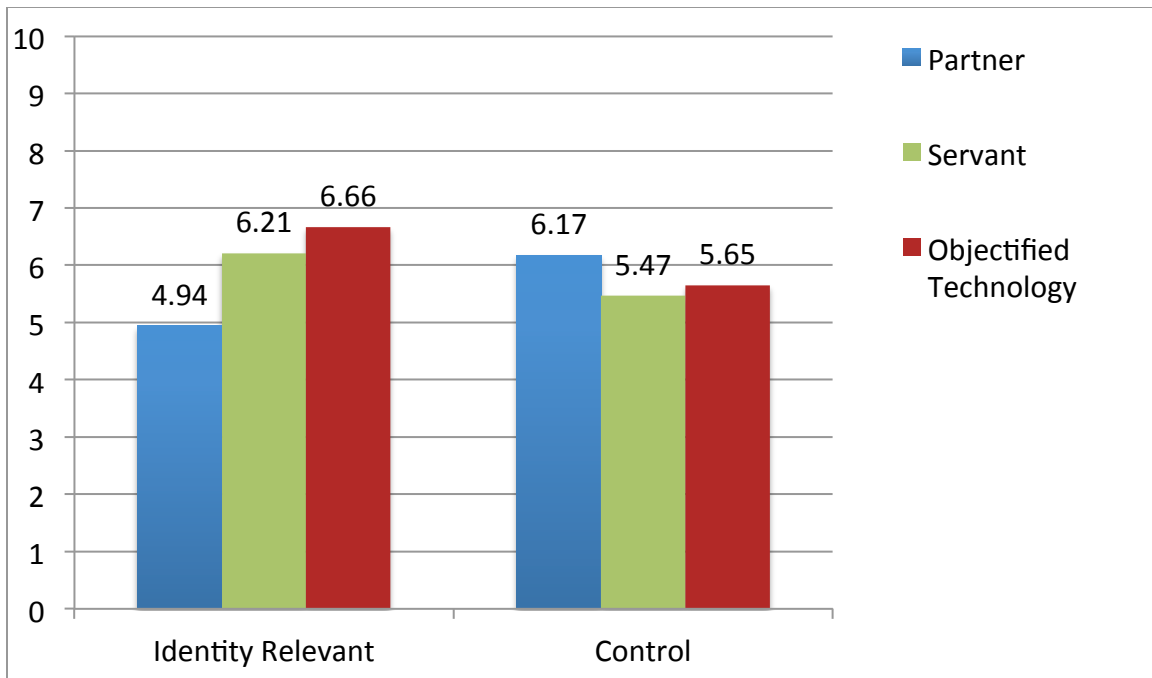


Figure 2.7: Study 4 Corrected Recognition by Sharing Partner and Identity Relevance

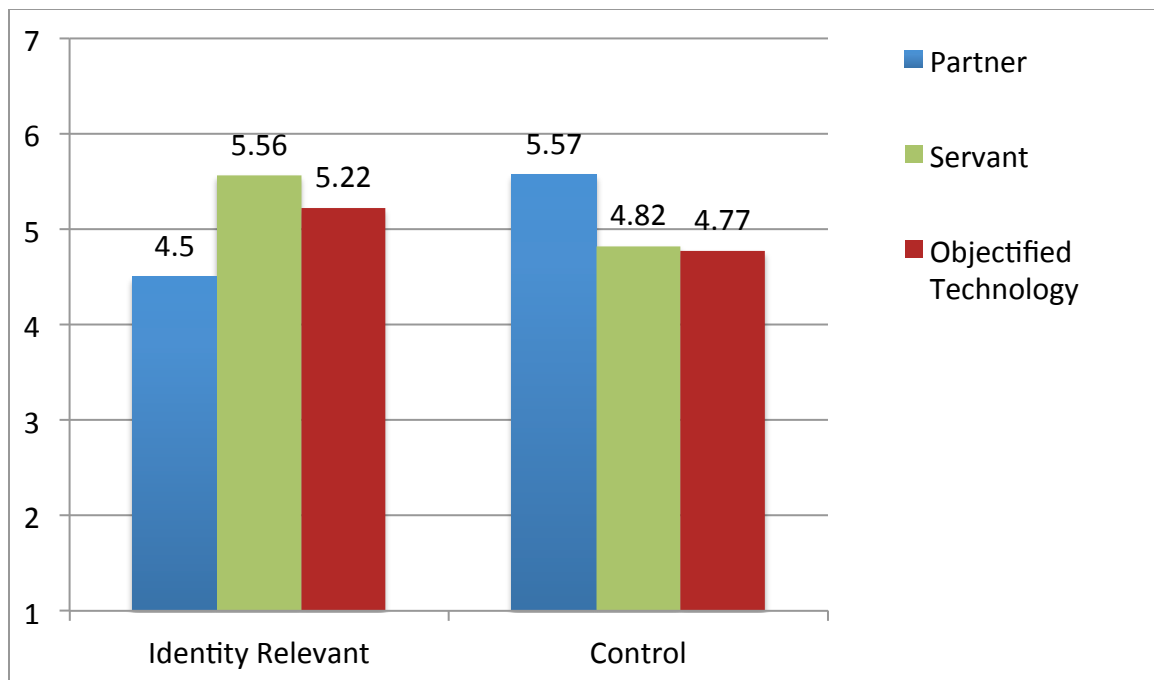


Figure 2.8: Study 4 Perceived Specialness by Sharing Partner and Identity Relevance

## CONCLUSION

With the advancement of communication technologies, the social sharing has experienced a dramatic growth in the last decade. As social media sharing is getting more and more popular, both marketing scholars and practitioners are interested in the consequences of such sharing behavior. While the positive outcomes of social sharing have been studied extensively, little research exists on the potential dark sides of social sharing. Meanwhile, the little knowledge about the social aspects of consumer memories raised considerable concerns because the memories are vital behavior drivers. My dissertation integrates social and memory and explores an understudied area. In the two essays, I attempt to fill the theoretical gap by examining the negative consequences of social sharing on consumer memory. I begin with a simple yet important question-do you remember it better after sharing your experience with others? Specifically, I investigate two types of social sharing-human-to-human interpersonal sharing and human-to-machine nonhuman interaction.

In the first essay, I introduce a novel concept-memory cloud: a virtual memory system among close others to upload and access the memories from all the members sharing this cloud. I find that perceiving this memory cloud available, the people sharing their memories to close others are more likely to forget the details of what they shared. The reason behind this intriguing forgetting-after-sharing effect is that people offload the details of their “want-to-remember” memories to the memory cloud and accidentally lead to memory decay (fail to remember what they want to remember). This effect is more



pronounced when the experience is highly identity relevant and when the sharing partner is perceived to be reliable. And the forgetting effect is attenuated when the experience is negative and when the sharing partner is nonhuman. In the second essay, I further dig into this forgetting-after-sharing effect and try to distinguish interpersonal sharing and the digital sharing. I find that when the sharing partner is nonhuman machine, people perceive them not socially acceptable (low in partner quality) and are less likely to rely on the technological partner to save the personal memories, and thus forgetting is less likely. However, if the technological partner has been anthropomorphized, it can function similar to human partners. Moreover, the roles the technological partner play also matter. Servant role is not equivalent to partner role and inhibits the perception of memory cloud. Finally, another key factor for digital sharing is whether the sharing platform is accessible. Inaccessibility can further impair the function of memory cloud and prevent the memory decay.

Overall, these two essays integrate offline and online sharing and document an intriguing forgetting-after-sharing effect and provide a new framework for consumer memory research. This dissertation offers unique insights to the literature of social sharing, consumer memory and identity marketing. Broadly, this dissertation fills an important gap of research on social aspects of memory-in particular, the social influence in the digital world.

## REFERENCES

- Aaker, Jennifer L. (1997), "Dimensions of Brand Personality," *Journal of Marketing Research*, 34 (August), 347–56.
- Aaker, Jennifer L., Susan Fournier, and Adam S. Brasel (2004), "When Good Brands Do Bad," *Journal of Consumer Research*, 31 (1), 1-16.
- Aggarwal, Pankaj, and Ann L. McGill (2007), "Is That Car Smiling at Me? Schema Congruity as a Basis for the Evaluation of Anthropomorphized Products," *Journal of Consumer Research*, 34(4), 468–79.
- , and Ann L. McGill (2012), "When Brands Seem Human, Do Humans Act Like Brands? Automatic Behavioral Priming Effects of Brand Anthropomorphism," *Journal of Consumer Research*, 39(2), 307–23.
- Ahn, Hee-Kyung, Hae Joo Kim, and Pankaj Aggarwal (2014), "Helping Fellow Beings: Anthropomorphized Social Causes and the Role of Anticipatory Guilt," *Psychological Science*, 25(1), 224-29.

Akgün, Ali E., John Byrne, Halit Keskin, Gary S. Lynn, and Salih Z. Imamoglu (2005),

“Knowledge Networks in New Product Development Projects: A Transactive Memory Perspective,” *Information & management*, 42(8), 1105-20.

Alavi, Maryam, and Amrit Tiwana (2002)’ “Knowledge Integration in Virtual Teams:

The Potential Role of KMS,” *Journal of the Association for Information Science and Technology*, 53(12), 1029-37.

Alba, Joseph W., J. Wesley Hutchinson, and John G. Lynch Jr. (1991), “Memory and Decision Making,” in *Handbook of Consumer Behavior*, ed. Harold Kassarian and Thomas Robertson, Englewood Cliffs, NJ: Prentice Hall, 1-49.

Arndt, Johan (1967), “Role of Product-Related Conversations in the Diffusion of a New Product,” *Journal of marketing Research*, 4 (3), 291-95.

Barasch, Alixandra, and Jonah Berger (2014), “Broadcasting and Narrowcasting: How Audience Size Affects What People Share,” *Journal of Marketing Research*, 51(3), 286-99.

Belk, Russell W. (2013), "Extended Self in a Digital World,” *Journal of Consumer Research*, 40 (3), 477-500.

Berger, Jonah (2014), "Word of Mouth and Interpersonal Communication: A Review and Directions for Future Research," *Journal of Consumer Psychology*, 24(4), 586-607.

———, (2013), "Beyond Virtual: Interpersonal Communication in the Internet Age," *Psychological Inquiry*, 24, 293-96.

———, and Chip Heath (2007), "Where Consumers Diverge from Others: Identity Signaling and Product Domains," *Journal of Consumer Research*, 34(2), 121-34.

———, and Katherine L. Milkman (2012), "What Makes Online Content Viral?" *Journal of marketing research*, 49 (2), 192-205.

———, and Eric Schwartz (2011), "What Drives Immediate and Ongoing Word of Mouth?" *Journal of Marketing Research*, October, 869-80.

Bhargave, Rajesh, Antonia Mantonakis, and Katherine White (2016), "The Cue-of-the-Cloud Effect: When Reminders of Online Information Availability Increase Purchase Intentions and Choice," *Journal of Marketing Research*, 53(5), 699-711.

Blumen, Helena M., and Suparna Rajaram (2008), "Influence of Re-Exposure and Retrieval Disruption during Group Collaboration on Later Individual Recall," *Memory*, 16(3), 231-44.

Bohn, Annette, and Dorthe Berntsen (2007), "Pleasantness Bias in Flashbulb Memories: Positive and Negative Flashbulb Memories of the fall of the Berlin Wall among East and West Germans," *Memory & Cognition*, 35 (3), 565-77.

Bone, Paula Fitzgerald (1995), "Word-of-Mouth Effects on Short-Term and Long-Term Product Judgments," *Journal of Business Research*, 32(3), 213-23.

Campbell, Margaret C., and Kevin Lane Keller (2003), "Brand Familiarity and Advertising Repetition Effects," *Journal of Consumer Research*, 30 (2), 292-304.

Carlson, Nicholas and Alyson Shontell (2013), "Mary Meeker's Latest Masterful Presentaion on The State of The Web," Retrieved on Apr 19, 2016 from <http://www.businessinsider.com/mary-meekers-latest-masterful-presentation-on-the-state-of-the-web-2013-5>

Chen, Zoey, and Jonah Berger (2013), "When, Why, and How Controversy Causes Conversation," *Journal of Consumer Research*, 40 (3), 580-93.

———, and ——— (2016), "How Content Acquisition Method Affects Word of Mouth," *Journal of Consumer Research*, 43 (1), 86-102.

———, and Nicholas H. Lurie (2013), “Temporal Contiguity and Negativity Bias in the Impact of Online Word of Mouth,” *Journal of Marketing Research*, 50(4), 463-76.

Chandler, Jesse, and Norbert Schwarz (2010), “Use Does Not Wear Ragged the Fabric of Friendship: Thinking of Objects as Alive Makes People Less Willing to Replace Them,” *Journal of Consumer Psychology*, 20(2), 138-45.

Chernev, Alexander, Ryan Hamilton, and David Gal (2011), “Competing for Consumer Identity: Limits to Self-Expression and the Perils of Lifestyle Branding,” *Journal of Marketing*, 75 (3), 66-82.

Chevalier, Judith A., and Dina Mayzlin (2006), “The Effect of Word of Mouth on Sales: Online Book Reviews,” *Journal of Marketing Research*, 43 (3), 345-54.

Christianson, Sven-Åke (1992), “Emotional Stress and Eyewitness Memory: A Critical Review,” *Psychological Bulletin*, 112 (2), 284-309.

Coleman, Nicole Verrochi, and Patti Williams (2013), “Feeling Like My Self: Emotion Profiles and Social Identity,” *Journal of Consumer Research*, 40 (2), 203-22.

Cordery, John L., and Christine Soo (2008), "Overcoming Impediments to Virtual Team Effectiveness," *Human Factors and Ergonomics in Manufacturing & Service Industries*, 18 (5), 487-500.

Cowley, Elizabeth, and Andrew A. Mitchell (2003), "The Moderating Effect of Product Knowledge on the Learning and Organization of Product Information," *Journal of Consumer Research*, 30(3), 443-54.

Dahl, Darren (2013), "Social Influence and Consumer Behavior," *Journal of Consumer Research*, 40 (2), iii-v.

Dalton, Amy N. and Li Huang (2014), "Motivated Forgetting in Response to Social Identity Threat," *Journal of Consumer Research*, 40(6), 1017-38.

Dietvorst, Berkeley J., Joseph P. Simmons, and Cade Massey (2015), "Algorithm Aversion: People Erroneously Avoid Algorithms after Seeing Them Err." *Journal of Experimental Psychology: General*, 144 (1), 114-26.

Duan, Wenjing, Bin Gu and Andrew B. Whinston (2008), "The Dynamics of Online Word-of-Mouth and Product Sales: An Empirical Investigation of the Movie Industry," *Journal of Retailing*, 84 (2), 233-42.

- Dubois, David, Andrea Bonezzi, and Matteo De Angelis (2016), "Sharing with Friends versus Strangers: How Interpersonal Closeness Influences Word-of-Mouth Valence," *Journal of Marketing Research*, 53(5), 712-27.
- , Derek D. Rucker, and Adam D. Galinsky (2010), "The Accentuation Bias: Money Literally Looms Larger (and Sometimes Smaller) to the Powerless," *Social Psychological and Personality Science*, 1(3), 199-205.
- Epley, Nicholas, Adam Waytz, and John T. Cacioppo (2007), "On Seeing Human: A Three-Factor Theory of Anthropomorphism," *Psychological Review*, 114(4), 864–86.
- Echterhoff, Gerald, E. Tory Higgins, and John M. Levine (2009), "Shared Reality Experiencing Commonality with Others' Inner States about the World," *Perspectives on Psychological Science*, 4 (5), 496-521.
- Fazio, Russell H. (1995), "Attitudes as Object-Evaluation Associations: Determinants, Consequences, and Correlates of Attitude Accessibility," in Petty, Richard E. and Jon A. Krosnick (Eds.), *Attitude Strength: Antecedents and Consequences*, 4, 247-82, Psychology Press, New York and London.



- Fitzgerald, Michael, Nina Kruschwitz, Didier Bronnet and Michael Welch (2013),  
“*Embracing Digital Technology: A New Strategic Imperative*” Retrieved on Apr  
18, 2016 from <http://sloanreview.mit.edu/projects/embracing-digital-technology/>
- Fournier, Susan (1998), “Consumers and Their Brands: Developing Relationship Theory  
in Consumer Research,” *Journal of Consumer Research*, 24(4), 343–73.
- Gable, Shelly L., Harry T. Reis, Emily A. Impett, and Evan R. Asher (2004), “What Do  
You Do When Things Go Right? The Intrapersonal and Interpersonal Benefits of  
Sharing Positive Events,” *Journal of personality and social psychology* 87(2),  
228.
- Ghuman, Mandeep Kaur, Li Huang, Thomas J. Madden, and Martin S. Roth (2015),  
“Anthropomorphism and Consumer-Brand Relationships,” in Susan. Fournier,  
Michael Breazeale, and Jill Avery (Eds.), *Strong Brands, Strong Relationships*,  
Routledge, New York, NY: pp135-148.
- Griffith, Erin (2016), “Facebook Users Are Sharing Fewer Personal Updates and It’s a  
Big Problem,” Retrieved on June 30, 2017 from  
<http://fortune.com/2016/04/07/facebook-sharing-decline/>
- Hartson, H. Rex, and Philip D. Gray (1992), “Temporal Aspects of Tasks in the User  
Action Notation,” *Human-Computer Interaction*, 7 (1), 1-45.

- He, Jun, Brian S. Butler, and William R. King (2007), "Team Cognition: Development and Evolution in Software Project Teams," *Journal of Management Information Systems*, 24 (2), 261-92.
- Henkel, Linda A. (2014), "Point-and-Shoot Memories: The Influence of Taking Photos on Memory for a Museum Tour," *Psychological Science*, 25 (2), 396-402.
- Hollingshead, Andrea B (1998b), "Communication, Learning, and Retrieval in Transactive Memory Systems," *Journal of Experimental Social Psychology*, 34 (5), 423-42.
- . (2001), "Cognitive Interdependence and Convergent Expectations in Transactive Memory," *Journal of Personality and Social Psychology*, 81(6), 1080-89.
- Hudson, Simon, Li Huang, Martin S. Roth, Thomas J. Madden (2016), "The Influence of Social Media Interactions on Consumer-Brand Relationships: A Three-Country Study of Brand Perceptions and Marketing Behaviors," *International Journal of Research in Marketing*, 33 (1), 27-41.
- Hur, Julia D., Minjung Koo, and Wilhelm Hofmann (2015), "When Temptations Come Alive: How Anthropomorphism Undermines Self-Control," *Journal of Consumer Research*, 42(2), 340-58.

Hutchinson, Matthew (2016), "User-Generated Content is Transforming B2C Marketing-

Are You Ready?" Retrieved on June 30, 2017 from

<https://www.salesforce.com/blog/2016/02/user-generated-content.html>

Isaacson, Walter (2007), *Einstein: His Life and Universe*, New York: Simon & Schuster.

Keller, Ed and Barak Libai (2009), "A Holistic Approach to the Measurement of WOM,"

*ESOMAR Worldwide Media Measurement Conference*, Stockholm.

Kensinger, Elizabeth A. (2007), "Negative Emotion Enhances Memory Accuracy

Behavioral and Neuroimaging Evidence," *Current Directions in Psychological*

*Science*, 16 (4), 213-18.

Kim, Hyeongmin Christian, and Thomas Kramer (2015), "Do Materialists Prefer the

"Brand-as-Servant"? The Interactive Effect of Anthropomorphized Brand Roles

and Materialism on Consumer Responses," *Journal of Consumer Research*, 42(2),

284-99.

Kim, Sara, and Ann L. McGill (2011), "Gaming with Mr. Slot or Gaming the Slot

Machine? Power, Anthropomorphism, and Risk Perception," *Journal of*

*Consumer Research*, 38(1), 94-107.

- , Rocky Peng Chen, and Ke Zhang (2016), “Anthropomorphized Helpers Undermine Autonomy and Enjoyment in Computer Games,” *Journal of Consumer Research*, 43(2), 282-302.
- Landwehr, Jan R., Ann L. McGill, and Andreas Herrmann (2011), “It’s Got the Look: The Effect of Friendly and Aggressive ‘Facial’ Expressions on Product Liking and Sales,” *Journal of Marketing*, 75(3), 132–46.
- Langston, Christopher A. (1994), “Capitalizing on and Coping with Daily-Life Events: Expressive Responses to Positive Events,” *Journal of Personality and Social Psychology*, 67, 1112–25.
- Lee, Jae-Nam, and Young-Gul Kim (1999), “Effect of Partnership Quality on IS Outsourcing Success: Conceptual Framework and Empirical Validation,” *Journal of Management information systems*, 15(4), 29-61.
- Lee, Jungki, and Arthur Allaway (2002), “Effects of Personal Control on Adoption of Self-Service Technology Innovations,” *Journal of Services Marketing*, 16 (6), 553-72.
- Lewis, Kyle (2004), “Knowledge and Performance in Knowledge-Worker Teams: A Longitudinal Study of Transactive Memory Systems,” *Management Science*, 50(11), 1519-33.

- , Maura Belliveau, Benjamin Herndon, and Joshua Keller (2007), "Group Cognition, Membership Change, and Performance: Investigating the Benefits and Detriments of Collective Knowledge," *Organizational Behavior and Human Decision Processes*, 103(2), 159-78.
- , and Benjamin Herndon (2011), "Transactive Memory Systems: Current Issues and Future Research Directions," *Organization Science*, 22 (5), 1254-65.
- Liang, Diane Wei, Richard Moreland, and Linda Argote (1995), "Group versus Individual Training and Group Performance: The Mediating Role of Transactive Memory," *Personality and Social Psychology Bulletin*, 21(4), 384-93.
- Liu, Yong (2006), "Word of Mouth for Movies: Its Dynamics and Impact on Box Office Revenue," *Journal of Marketing*, 70 (3), 74-89.
- Loftus, Elizabeth F. (1993), "The Reality of Repressed Memories," *American Psychologist*, 48 (5), 518-37.
- Markets and Markets (2016), "Cloud Storage Market worth 74.94 Billion USD by 2021," Retrieved on June 30, 2017, from <http://www.marketsandmarkets.com/PressReleases/cloud-storage.asp>

- Mercurio, Kathryn R., and Mark R. Forehand (2011), "An Interpretive Frame Model of Identity-Dependent Learning: The Moderating Role of Content-State Association," *Journal of Consumer Research*, 38 (3), 555-77.
- , Americus Reed, and Mark Forehand (2013), "Savoring through Avoidance: Identity-Based Strategic Memory Protection," Paper presented at *the Association for Consumer Research Conference*, Chicago, IL.
- Moore, Sara G. (2012), "Some Things Are Better Left Unsaid: How Word of Mouth Influences the Storyteller," *Journal of Consumer Research*, 38 (6), 1140-54.
- Mourey, James A., Jenny G. Olson, and Carolyn Yoon (2017), "Products as Pals: Engaging with Anthropomorphic Products Mitigates the Effects of Social Exclusion," *Journal of Consumer Research*, 44, 414-31.
- Nedungadi, Prakash (1990), "Recall and Consumer Consideration Sets: Influencing Choice without Altering Brand Evaluations," *Journal of Consumer Research*, 263-76.
- Nestojko, John F., Jason R. Finley, and Henry L. Roediger III (2013), "Extending Cognition to External Agents," *Psychological Inquiry*, 24 (4), 321-25.

- Ochsner, Kevin N. (2000), "Are Affective Events Richly Recollected or Simply Familiar? The Experience and Process of Recognizing Feelings Past," *Journal of Experimental Psychology: General*, 129 (2), 242-61.
- Parker-Pope, Tara (2010), "An Ugly Toll of Technology: Impatience and Forgetfulness", Retrieved on June 30, 2017 from <http://www.nytimes.com/2010/06/07/technology/07brainside.html>
- Pennebaker, James W., Emmanuelle Zech, and Bernard Rimé (2001), "Disclosing and Sharing Emotion: Psychological, Social, and Health Consequences," *Handbook of Bereavement Research: Consequences, Coping, and Care*, 517-43.
- Prichard, Jane S., and Melanie J. Ashleigh, (2007), "The Effects of Team-Skills Training on Transactive Memory and Performance," *Small Group Research*, 38 (6), 696-726.
- Protalinski, Emil (2011), "Zuckerberg: 4 Billion 'Things' Are Shared on Facebook Every Day," Retrieved on June 30, 2017, from <http://www.zdnet.com/article/zuckerberg-4-billion-things-are-shared-on-facebook-every-day/>

- Puzakova, Marina, Hyokjin Kwak, and Joseph F. Rocereto (2013), "When Humanizing Brands Goes Wrong: The Detrimental Effect of Brand Anthropomorphization Amid Product Wrongdoings," *Journal of Marketing*, 77(3), 81-100.
- Rajagopal, Priyali, and Nicole Votolato Montgomery (2011), "I Imagine, I Experience, I Like: The False Experience Effect," *Journal of Consumer Research*, 38 (3), 578-94.
- Rasmussen, Anne S., and Dorthe Berntsen (2009), "Emotional Valence and the Functions," *Memory & Cognition*, 37 (4), 477-92.
- Reed, Americus, Mark R. Forehand, Stefano Puntoni, and Luk Warlop (2012), "Identity-Based Consumer Behavior," *International Journal of Research in Marketing*, 29(4), 310-21.
- Rimé, Bernard, Batja Mesquita, Stefano Boca, and Pierre Philippot (1991), "Beyond the Emotional Event: Six Studies on the Social Sharing of Emotion," *Cognition & Emotion*, 5 (5-6), 435-65.
- , Catrin Finkenauer, Olivier Luminet, Emmanuelle Zech, and Pierre Philippot (1998), "Social Sharing of Emotion: New Evidence and New Questions," *European Review of Social Psychology*, 9 (1), 145-89.



Roth, Martin S (1995), “The Effects of Culture and Socioeconomics on the Performance of Global Brand Image Strategies,” *Journal of Marketing Research*, 32(2), 163-75.

Rucker, Derek D., Miao Hu, and Adam D. Galinsky (2014), “The Experience versus the Expectations of Power: A Recipe for Altering the Effects of Power on Behavior,” *Journal of Consumer Research*, 41(2), 381-96.

Rudo, Paul (2012), “What Actually is Cloud Memory?” Retrieved on June 30, 2017 from <http://www.enterprisefeatures.com/what-actually-is-cloud-memory/>

Rydell, Robert J., Michael T. Rydell, and Kathryn L. Boucher (2010), “The Effect of Negative Performance Stereotypes on Learning,” *Journal of Personality and Social Psychology*, 99 (6), 883-95.

Schank, Roger C., and Robert P. Abelson (1995), “Knowledge and Memory: The Real Story,” *Knowledge and Memory: The Real Story, Advances in Social Cognition*, 8, 1-85.

Shen, Hao, Meng Zhang, and Aradhna Krishna (2016), “Computer Interfaces and the Effect of “Direct Touch” on Consumer Choice: Can iPads make us Unhealthy?” *Journal of Marketing Research*, 53(5), 745-58.

- Sparrow, Betsy, Jenny Liu, Daniel M. Wegner (2011), "Google Effects on Memory: Cognitive Consequences of Having Information at Our Fingertips," *Science*, 333, 776-78.
- , and Liubica Chatman (2013), "Social Cognition in the Internet Age: Same as It Ever Was?" *Psychological Inquiry*, 24 (4), 273-92.
- Storm, Benjamin C., and Sean M. Stone (2015), "Saving-Enhanced Memory The Benefits of Saving on the Learning and Remembering of New Information." *Psychological Science*, 26 (2), 182-88.
- Talarico, Jennifer M., Kevin S. LaBar, and David C. Rubin (2004), "Emotional Intensity Predicts Autobiographical Memory Experience," *Memory & Cognition*, 32(7), 1118-32.
- Tamir, Diana I., and Jason P. Mitchell (2012), "Disclosing Information about the Self Is Intrinsically Rewarding," *Proceedings of the National Academy of Sciences*, 109(21), 8038-43.
- Tinti, Carla, Susanna Schmidt, Silvia Testa, and Linda J. Levine (2014), "Distinct Processes Shape Flashbulb and Event Memories," *Memory & cognition*, 42(4), 539-51.

- Triandis, Harry C (1989), "The Self and Social Behavior in Differing Cultural Contexts," *Psychological review*, 96(3), 506-20.
- v. Wangenheim, Florian, and Tomás Bayón (2004), "The Effect of Word of Mouth on Services Switching: Measurement and Moderating Variables," *European Journal of Marketing*, 38(9/10), 1173-85.
- Wagner, Ullrich, Lisa Galli, Björn H. Schott, Andrew Wold, Job van der Schalk, Antony SR Manstead, Klaus Scherer, and Henrik Walter (2015), "Beautiful Friendship: Social Sharing of Emotions Improves Subjective Feelings and Activates the Neural Reward Circuitry," *Social Cognitive and Affective Neuroscience*, nsu121, 1-8.
- Wang, Lisa C., Julie Baker, Judy A. Wagner and Kirk Wakefield (2007), "Can a Retail Web Site Be Social?" *Journal of Marketing*, 71(3), 143-57.
- Wang, Zongyuan, and Michelle R. Nelson (2014), "Tablet as Human: How Intensity and Stability of the User-Tablet Relationship Influences Users' Impression Formation of Tablet Computers," *Computers in Human Behavior*, 37, 81-93.
- Ward, Adrian F. (2013), "Supernormal: How the Internet is Changing Our Memories and Our Minds," *Psychological Inquiry*, 24 (4), 341-48.

- Waytz, Adam, Joy Heafner, and Nicholas Epley (2014, “The Mind in the Machine: Anthropomorphism Increases Trust in an Autonomous Vehicle,” *Journal of Experimental Social Psychology*, 52, 113-17.
- Wegner, Daniel M. (1987), “Transactive Memory: A Contemporary Analysis of the Group Mind”, In *Theories of Group Behavior* (pp. 185-208). Springer New York.
- . (1995), “A Computer Network Model of Human Transactive Memory,” *Social Cognition*, 13(3), 319-39.
- , Toni Giuliano, and Paula T. Hertel (1985), “Cognitive Interdependence in Close Relationships,” In *Compatible and Incompatible Relationships*, pp. 253-76. Springer New York.
- , Ralph Erber, and Paula Raymond (1991), “Transactive Memory in Close Relationships,” *Journal of Personality and Social Psychology*, 61(6), 923–29.
- Wogan, Michael, and Rolland H. Waters (1959), “The Role of Repetition in Learning,” *The American journal of psychology*, 72, 612-13.
- Yuan, Y. Connie, Janet Fulk, and Peter R. Monge (2007), “Access to Information in Connective and Communal Transactive Memory Systems,” *Communication Research*, 34 (2), 131-55.

Zauberman, Gal, Rebecca K. Ratner, and B. Kyu Kim (2009), "Memories as Assets: Strategic Memory Protection in Choice Over Time," *Journal of Consumer Research*, 35 (5), 715-28.